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RICHARD P. ROTHWELL, C. E., M. E., } Editors.
ROSSITER W. RAYMOND, Ph. D., }

T. P. VAN WAGENEN, M. E., Denver, Colo.,
DON ANTONIO DEL CASTILLO, *Director of the School of Engineers*, City of Mexico, Mexico, } Staff Correspondents.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. Articles written by Mr. RAYMOND will be signed thus *.

Business communications for the Western Department should be addressed to the Western Office at Denver, Colo.

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In answer to sixteen irate relatives of Mr. HOLLEY, we beg to remark that it was not we, but the printer, who proposed in our columns last week to "patronize" them. What we intended was to *fraternize*. The difference, be it observed, is "simply immense"—and so was the sadness of the proof-reader, after we had interviewed him about this and other matters. *

In the article on "Engineering in the Turkish Empire," published in another column, many of our readers will welcome the hand of an old friend, Mr. E. M. GRANT, a graduate of the Rensselaer Institute, and a civil and mining engineer of ability. Mr. GRANT is now the chief of the corps of correspondents of the London *Times* with the Russian army in Europe, and is winning laurels in that capacity. We are glad that he has not quite forgotten his former profession, or the ENGINEERING AND MINING JOURNAL, in the columns of which he is always welcome. *

THE MISSISSIPPI JETTIES.

Captain EADS, the engineer who has been executing under contract with the Government a scheme for improving by jetties the channel of one of the passes at the mouth of the Mississippi, now appears as the author of a plan which, the newspapers announce, will supersede the enormously expensive levee and outlet system, for maintaining the channel of the whole river, and protecting its neighborhood in the southern alluvial regions from disastrous floods. The appearance of these brief journalistic essays on fluviatile engineering leads us to suspect that another contract is in process of incubation; and we shall not be surprised to hear of the introduction, after the public mind shall have been sufficiently prepared, of a bill in Congress, handing over the whole lower Mississippi to the gentleman who has been improving its mouth.

The arguments thus far adduced in favor of Captain EADS's latest plan are the following: First, his theories have hitherto, when applied in practice for the improvement of the Mississippi channel, achieved "unqualified success," in spite of the evil prognostications of government engineers, Captain EADS having secured a "permanent improvement,' whereas the expenditure of nearly eight million dollars in temporary expedients before his time had been comparatively fruitless. Secondly, his present plan, though based on a new theory, ought to be accepted with considerable confidence, because of the remarkable indorsement which experience has given to his views already. Now, so far as we can perceive, the jetty system at the South Pass has not succeeded any better than its intelligent opponents predicted; the doctrine now propounded as to levees and outlets is not new; and both of these schemes belong to the category of those which are condemned, not by theories merely, but by well-ascertained facts.

Professional men of every class are familiar with the strange fascination exerted upon untrained minds by propositions which contradict, and are alleged to confound, the experts. The believers in the divining-rod defy with exultation the arguments of the physicist and geologist. Quack doctors are all the more eagerly trusted because they claim to cure those whom the regular faculty have pronounced beyond help. KEELY motors find a strong recommendation to favor in the fact that they disprove the "hitherto accepted" laws of force. And the operations of Captain EADS below New Orleans, while they do not by any means belong to the same class as these illustrations, have nevertheless, through the letters of enthusiastic correspondents, appealed to the same feeling, and have been heralded with special triumph, as overthrowing the theories of distinguished engineers employed by the Government. It seems to be popularly supposed that the Chief of the Corps of Engineers has declared the project of the deepening of the entrance to the Mississippi by means of jetties to be impracticable; and that the actual passage of large ships through the channel so deepened has completely discredited his view, and proved the "unqualified success" of the disputed scheme. That this popular impression is a popular error, it is easy to show.

In 1861, Captain (now Major-General) A. A. HUMPHREYS and Lieutenant (now Brigadier General) H. L. ABBOTT, submitted to the War Department their celebrated report upon the Mississippi. Instead of being an ingenious structure of *a priori* reasoning, this magnificent treatise is peculiarly a collection of numerous, accurate, unimpeachable observations, upon which, by legitimate induction, its conclusions of theory are based. Under the head of "Recommendations for Improving the Navigation of the Mouths," it speaks as follows:

"The development of the laws which govern the formation of the bars has removed all uncertainty as to the principles which should guide an attempt to deepen the channels over them. The erosive or excavating power of the current must be increased relatively to the depositing action. This may be done either by increasing the absolute velocity of the current over the bar, or by artificially aiding its action. To the first class of works belong jetties and the closure of lateral outlets; to the latter, stirring up the bottom by suitable machinery, blasting, dragging the material seaward, and dredging by buckets. These plans are all correct in theory, and the selection from them should be governed by economical considerations."

General HUMPHREYS, who has since become Chief of Engineers, repeats this paragraph in his annual report of 1874. It should be added that the practical application of the jetty system is perfectly familiar to our army engineers, having been successfully made at a large number of lake ports in the United States. The grounds of objection to its use at the mouth of the Mississippi were purely economical.

These objections, as may be seen from the reports of the Chief of Engineers in 1874 and 1875, chiefly turn upon the necessity of extending the jetties, as the bar advances seaward under their influence; and the rate of this advance, and of the consequent necessary extension, is the point on which opinions differ. The opinion of General HUMPHREYS is based upon the theory of bar formation deduced by General ABBOTT and himself from careful experiment. The arguments drawn from the analogy of successful jetties in other cases, particularly at the mouths of European rivers, where the necessary annual extension of the work was said to have been comparatively small, have been met by the statement that in such cases, as also at our own lake ports, the bars removed did not consist of the sediment brought down by the rivers themselves, and that where this is the nature of the bar, as, for instance, at the mouth of the Rhone, the jetty system has proved too expensive and ineffective to be maintained.

It is not our present purpose to enter upon the argument, but only to point out that by the very nature of it the first effect of the jetties below New Orleans cannot be said to settle the question either way. The test of economy and permanence of benefit still remains to be observed; and this is the only one which has been appealed to. The claim that Captain EADS has effected a "permanent" improvement is decidedly premature.

In fact, there are some signs already of trouble not positively prophesied, though perhaps cautiously hinted by General HUMPHREYS. We hear rumors of puzzling changes in progress on the bar seaward of the jetties. The channel, it is said, shifts perpetually, to the great embarrassment of pilots, and, according to the opinion of some observers, even the advantages already achieved are beginning to wane. Whether these symptoms are serious or not, it becomes the friends of the jetty system to wait awhile before pronouncing its success complete. There is no doubt that the jetties must be extended: the only question is, How far and how fast? So far as previous argument could answer this question, the balance of the proofs seems to be against the sanguine expectations of the jetty party. Time may reverse this conclusion, but the time which has thus far elapsed since the commencement of the work is not sufficient to offer decisive favorable evidence.

Captain EADS's "new theory" for superseding the levees is too imperfectly stated in the daily papers to permit a fair discussion of it. Apparently, it is a revival of the notion that by closing the side outlets the power of the current to scour out the channel would be increased, and that, the channel being thus deepened, navigation would be improved, and the effects of floods diminished at the same time. Whoever thinks this theory a new one may be convinced of his error by consulting the report of HUMPHREYS and ABBOTT, in which, sixteen years ago, it was fairly stated, and, we think, completely refuted. Captain EADS is reported as saying that, "if the power of the stream in the channel is diminished by tapping the river with outlets, the slackened current will be unable to carry its full freight of earthy material, and deposits in the channel will go on," etc. But actual examinations have shown that this does not take place.

The theoretical argument in favor of Captain EADS's present view was ably stated twenty-seven years ago by Major (now Major General) J. G. BARNARD. But he based his reasoning upon two assumptions: That the bottom of the Mississippi is composed of its own alluvium, which can be readily acted upon by the current; and that its water is always charged with sediment to the maximum capacity allowed by its velocity. Both these assumptions were subse-

quently disproved by careful investigation, which showed that the Mississippi bottom is tenacious clay, geologically older than the alluvium, and but slightly susceptible to the strongest currents; and that the amount of sediment carried by the river at different times is not proportional to its velocity. Before these facts had been ascertained the theoretical argument which ignored them might well have been supported even by so thorough an engineer as General BARNARD. But to revive it now is to throw away all that precise investigation has gained; and if Captain EADS has done this he is no more entitled to credit for soundness than for originality.

It may be surmised that this proposition to close the outlets really proceeds from the desire to increase the volume of the current between the jetties at the mouth of the river, and thus add to their efficiency. If this is the case, it would be more frank and wise to say so at once, instead of claiming that the measure proposed would deepen the channel of the river above, or diminish the effects of floods, or in any degree whatever supersede the levees. Especially is it unfair to ask that public confidence be given to the new plan on account of the complete success of the jetties, if the new plan be, in fact, but a device to prevent or postpone the economical failure of the jetties.

Our remarks apply primarily to the newspaper friends of Captain EADS, who are manipulating public opinion in his favor. How far he himself deserves these criticisms, depends upon the extent to which he has heretofore inspired, or may hereafter indorse, the statements which we have censured.

THE LOWE GAS PROCESS.

A Report by Prof. Henry Wurtz.

In the criticism upon the report of Profs. ROGERS and STEVENS to the Philadelphia Gas Trust on the LOWE gas, which was published in the JOURNAL of Nov. 10, the ground was taken that, by their own showing, the methods employed by those gentlemen for collecting the gas and for testing it subsequently were so objectionable as to render the results obtained almost valueless.

The soundness of this criticism appears to be proven by the report from Prof. HENRY WURTZ (an eminent authority in this department of investigation), which we publish herewith. As his tests at Manayunk correspond closely with those made by him at Utica, as also with those of other professional gentlemen elsewhere, it would seem to demonstrate that there are no climatic or chemical reasons why a twenty-candle gas should not burn in the atmosphere of Philadelphia.

We regret to record that the Citizens Company, which, during the past season, has put an entirely new plant, after the LOWE plan, into Indianapolis, has suffered the loss of a holder by one of those mysterious explosions which will sometimes occur. The coal-gas companies in England, Europe, and our own country have sustained similar disasters, without being able to account for the cause. In Philadelphia, Cincinnati, St. Louis, and Cleveland, holders have blown up at different times, and some six years ago the Brooklyn Company, it will be remembered, had their large gasometer destroyed and much damage done.

The formation of an explosive mixture of atmospheric air and gas is, of course, understood, and its increased liability to form during displacement in new apparatus and mains; but, under proper care, how ignition can occur is quite perplexing. We are informed that the Indianapolis company ordered a new holder at once, and will keep the citizens waiting for the new gas as short a time as possible.

REPORT ON THE LOWE GAS AT MANAYUNK.

By Henry Wurtz.

TO THE CONSUMERS' GAS COMPANY OF JERSEY CITY:

GENTLEMEN—Being requested to make a second visit to Manayunk, and determine the photometric value of the gas now being made there by the Lowe process, I have done so, and beg to report as follows:

A fine photometric apparatus was erected, which was obtained from Mr. W. W. Goodwin, of Philadelphia, with clock-meter, by which the flow could be kept constantly at five cubic feet per hour.

The candles used were also from Mr. Goodwin.

They were weighed delicately upon one of my own Becker balances, taken from my laboratory to Manayunk, and with a fine set of Becker's platinum chemical weights, whose accuracy has been verified by myself.

The photometric disk was a new one, of my own making, with square spot, which disappeared absolutely.

On arriving at Manayunk, I found that for the *crude* petroleum (of specific gravity 0·8) used there for enrichment at the time of my former visit a year ago (as also at Utica during my investigation of two years ago at that place), there has now been substituted a *light naphtha*, of specific gravity 0·706.

Desiring to obtain results as nearly as possible comparable with those obtained at Utica, I directed that a somewhat larger proportion of this lighter enriching agent should be used.

This was chiefly on account of the lower density of the naphtha, but also partly because the latter contains—weight for weight—about one per cent. less carbon than crude petroleum of average density.

The history of the gas tested and collected for analysis was as follows:

The generation began at 3 P. M., October 25, and ended at 3 P. M., October 26. No gas from the coal benches was being made into the large holder during this time. The total gas generated was 193,000 cubic feet (too large a make, probably, for the small purifiers to carry, even under favorable circumstances). The amount of anthracite consumed was 9,843 pounds, or 51 pounds per 1,000 feet of compound gas, or at the rate of 44,000 cubic feet per long ton (2,240 pounds) of anthracite.

The amount of naphtha of 70° Baume was 791 gallons, or 4·1 gallons per 1,000 cubic feet of compound gas; as against 3·15 gallons of crude petroleum of 46° Baume used at Utica during my examination in October, 1875.

This gas was found—as on my previous visit to Manayunk in October, 1876—to be imperfectly purified, staining lead-paper and precipitating lime-water. This is due to inadequate tray-surface in the purifying-boxes to withstand the violent, though transient, rush of gas from the generators during the rapid stages of its evolution, which causes perforations through the layers of lime, rendering them inefficient for further work.

In my report made of this previous visit—addressed to Mr. Thomas R. Brown, Chief Engineer of the Gas Trust—an improvement in the process was proposed, by introducing between the condensers and the purifiers a small holder to act as a governor. This has not yet been carried out.

The photometric tests were made upon the gas in the large holder on the 26th of October, between the hours of 12 M. and 3:15 P. M.

They were two in number, and continued during one hour each, the disk being observed at three-minute intervals, or twenty observations during each hour. The mean of all the observations was equal to 20·006 candles burning at the rate of 120 grains of sperm per hour.

Had the gas been freed by complete purification from the two per cent. of carbonic acid which it still retained, its candle power would have been at least ten per cent. higher, or 22 candles.

It should be added that the burner used was well adapted to the gas, being a 19-candle 27-hole Sugg argand, selected by Mr. Goodwin.

The pressure required at this burner to pass five feet per hour was nine-tenths of an inch of water. With inferior burners, doubtless, a somewhat lower candle-power might be arrived at.

All of which is respectfully submitted.

NEW PUBLICATIONS.

TABLES FOR THE DETERMINATION OF MINERALS, by those Physical Properties ascertainable by the aid of such Simple Instruments as every Student in the Field should have with him. Based on the Tables of WEISBACH. Enlarged, and furnished with a set of Mineral Formulas, a Column of Specific Gravities, and one of the characteristic Blowpipe Reactions. By PERSIFOR FRAZER, JR., A. M., Assistant Geologist of the Second Geological Survey of Pennsylvania, etc. Philadelphia: J. B. Lippincott & Co. 1878.

This revised edition of Prof. FRAZER'S tables contains numerous corrections and alterations, besides several new features, calculated to increase the usefulness of the book, without sacrificing its convenient smallness. The different species are characterized by symbols, indicating their frequency in mineral collections. A table of elements, with their atomic weights and valences, has been added to the tables of hardness and fusibility. From these chemical equivalents the theoretical percentage of each constituent element of a mineral species may be calculated, with the help of the formula given in the general tables. We have found the book very convenient for handy reference in the study or the field, though we have made no use of the "rational formulas" as such; and do not, indeed, consider them quite appropriate to a manual designed wholly for practice. By Prof. FRAZER'S own admission, many of them rest upon bold assumptions; some of them he has altered since the first edition; and none of them are required for the simple work of determining minerals, to which the rest of the book is exclusively devoted. Employed as empirical formulas, however, by disregarding the signs of valence, they are practically useful, apart from any theory of molecular constitution; and we are willing to admit that for many species such empirical formulas are free from the scientific objection attaching to those which represent a mineral as consisting of two or more compounds, simply added together.

We suggest to Prof. FRAZER that it would be well to introduce a tabular exhibit and explanation of the signs, symbols, and abbreviations employed. It is annoying to one consulting the book in haste, to be obliged to hunt through one preface for the meaning of the asterisk, and another for the dagger. Moreover, the few and simple crystallographic symbols employed might be briefly explained, with or without diagrams. *

MONEY AND LEGAL TENDER IN THE UNITED STATES. By H. R. LINDERMAN, Director of the Mint. New York: G. P. Putnam's Sons. 1877.

It is pleasant, in the midst of wild assertions and denials, bogus statistics, and fantastic deductions, to come upon a book which deals in facts only, concerning the pending problems of coinage and resumption. We notice that Dr. LINDERMAN has been accused of violating official propriety by taking sides in the controversy now on foot. If he had actually done what is charged, we do not see how it could be considered improper. But the truth is, it is not Dr. LINDERMAN, but *the facts*, that take sides. If a simple statement of them reads like an argument against the Silver Bill, who is to blame? We do not comprehend how any man can seriously advocate, on grounds of public policy (though it might be done for reasons of private advantage), the unlimited legal tender coinage of silver, after a candid study of these pages. The Director of the Mint deserves high praise for the courage with which he has faced the dangerous clamor of the party now arrayed against the national credit, and for the clear prevision with which he has anticipated the forms which the silver heresy was likely to assume, and furnished for each a conclusive objection. The book contains a convenient summary of past and present laws relating to coinage, legal tender, and the money standard; pithy comments upon the historical and the pending aspects of these questions, and a mass of pertinent statistics. It costs but $1.25; and we wish every voter had a copy. Public speakers ought to read more extended treatises also: but we might well give thanks if many of them would go so far as to master the contents of this one. *

REPORT UPON UNITED STATES GEOGRAPHICAL SURVEYS WEST OF THE 100TH MERIDIAN. In Charge of First Lieutenant GEORGE M. WHEELER, Corps of Engineers, U. S. A. Vol. IV., Palæontology. Washington. 1877.

This volume, published in the handsome style with which its predecessors from WHEELER, KING, and HAYDEN have familiarized the public, contains the Report of CHARLES A. WHITE, M. D., upon the invertebrate fossils collected in

Nevada, Utah, Colorado, New Mexico, and Arizona, and that of Prof. E. D. COPE upon the extinct vertebrates obtained in New Mexico in 1874. Deserved recognition is awarded to the services of Mr. G. K. GILBERT, the Geologist of WHEELER'S Expedition, for that intelligent co-operation without which the labors of palæontologists might fail of definite results. Dr. WHITE'S work has been confined to the description and classification of the fossils; but Prof. COPE gives also, as the result of personal observation in the Field, a sketch of the stratigraphical geology of the Mesozoic and Tertiary beds of Northern New Mexico. From a passage on page 13 of COPE'S Report, we infer that he is not likely to accept KING'S theory of catastrophic disturbances, producing a great destruction and re-introduction of life, as the explanations of violent changes in fauna and flora. The sudden appearance of new species he ascribes wholly to migration. Of course Mr. KING would say the same, and would add that "plastic" species are the ones to migrate into new conditions, while less plastic ones must migrate *with* their appropriate conditions, or die. In other words, as we have said before, "plasticity" is a part of "fitness." We should like to know, by the way, on what authority Prof. COPE writes *faunæ* and *floræ* as plural forms. We can understand how the plural of *habitus* may be *habiti*, and of *omnibus*, *omnibi*; but this excessive pluralism is puzzling. We suspect that too much plural is not good for Latin. *

PETROLEUM IN JAPAN.

A REVIEW WRITTEN FOR THE ENGINEERING AND MINING JOURNAL.

By H. S. Munroe, E. M., Ph. D., etc.

Mr. Benjamin S. Lyman, of Philadelphia, lately in charge of the Geological Survey of Yesso, was engaged, in February, 1876, by the Interior Department of the Japanese Imperial Government, to examine and report upon the oil lands of the provinces of Shinano and Echigo (Nagano and Niigata Ken). A report of progress* for 1876, just received, gives much new and valuable information regarding the occurrence of petroleum in Japan.

Petroleum-bearing springs and natural gas wells have long been known to the Japanese, but only of late years have they been utilized. According to Japanese writers, petroleum—"burning water"—was first found in Echigo, A. D. 615, at Kusodzu, or "stinking water" village, by the name of which village rock oil is now generally known.

At first the petroleum was probably collected by simply skimming the surface of the water at these natural springs. Later, the springs were cleaned out and enlarged, and pits dug in the gravel and soft clay rock. At one place, Kurokawa, tunnels were made in the hillside to tap the sources of the oil supply.

The usual practice is to dig wells three feet or more square, and as deep as required. The work of sinking these wells requires five men, working during the day while the light is good. Of these, two are probably skilled workmen, the others laborers who hoist the excavated material. The miners work in short shifts, one remaining at the bottom of the well from nine o'clock to noon only, and the other from noon to three o'clock. The rock in which the wells are excavated would seem to be soft and easily worked, probably with pick and hoe alone; as the oil-bearing rocks belong to the Toshibets group, which group is made up of soft sandstones and shales and still softer clay rocks. The miner, who is not at work remains at the mouth of the well, to direct the coolies who are hoisting rock, and, at the same time, to supply his fellow at the bottom with fresh air. The blowing machine by which this is effected is a wooden box sunk in the ground, about six feet long by three feet wide and two feet deep; with a tilting cover, balanced in the middle of its length, and moving between the sides of the box on a horizontal axis. A vertical partition below the axis, containing a small valve, divides the two ends of the box. The workman stands upon the board and walks from one end to the other, thus alternately depressing each, and forcing the air first from one end of the box, and then from the other, into a wooden air pipe, about eight-tenths of a foot square, placed in one corner of the well. Similar blowing machines are used in some of the smelting works to supply blast to the furnaces; in this case, of large size, and worked by six or eight men. The earth or rock excavated is raised in rope nets, by three men, by means of a rope passing over a wheel one foot in diameter, hung just under the roof of the hut which covers the well. On account of the gas and inflammable vapor, artificial light cannot be used in mining, and a window of translucent oiled paper is made in the roof over the mouth of the well. At the bottom of a deep well, it is said to be as dark as starlight. In certain cases, horizontal galleries are driven from the bottom of the well to increase the yield of oil by draining a large area of rock. In these side galleries, the want of light becomes serious, for they are quite dark a few feet only from the bottom of the well. Mr. Lyman suggests as a means of giving light a rude heliostat, made of a number of small mirrors in a window frame, with a fixed mirror at the bottom to reflect the light into the side galleries, or, for night work the use of Geissler tubes.

The well is timbered with large pieces of board at the corners, and light cross pieces, which last serve also as a ladder for going up and down, though at such times a rope is tied under the arms of the workmen and held by several men at the top.

The expense of digging a well of this character is not great, the rock usually being soft and easily excavated. One well 900 feet deep is said to have cost but $1,000. Shallow pits fifty to sixty feet deep would cost much less in proportion, probably not more than $10 or $12.

The yield of oil is usually small, not often more than a few gallons per day. When first dug, the wells are more productive, yielding sometimes as much as fifteen or twenty barrels. In such case, however, wells are quickly sunk by other parties as near as possible, often within a few yards, and the yield of the original well falls off rapidly. Whether, in case the underground workings should connect, it becomes usual to resort to spears and matchlocks or to revolvers and breech-loading rifles, as in some other countries, is not stated.

One well, mentioned by Mr. Lyman, dug in 1871, yielded for fourteen days an average of nineteen barrels per day; after that, eight barrels. In January, 1873, the yield was but one-half barrel daily. In February the well, being deepened, gave nearly three barrels a day. From this time the flow diminished till in December, 1874, the daily yield was about thirteen gallons, when water put a stop to further operations.

The oil is in all cases raised to the surface in buckets, and in wells of small yield has to be carefully skimmed from the surface of the water.

The introduction of kerosene and kerosene lamps from America stimulated the search for oil in new localities and the digging of new wells. The production, though by these means largely increased, probably never reached more than one-sixth or one-seventh of the imports, and has so far only supplied the local demand of Niigata Ken vicinity.

A petroleum bubble of some size was also blown in the shape of a Japanese rock oil company, who secured a large amount of oil-land, bought expensive well-boring machinery, and engaged the services of a foreign adventurer as manager. After spending a good deal of money in expensive borings which cost more and yielded less than the wells dug by the Japanese method, the bubble burst, and the machinery and oil-lands were taken by the government to pay the salary of the manager, etc.

Petroleum, as already mentioned, is found in a series of soft sandstones, clay rocks, and shales, resembling to a certain extent the rocks of the Toshibets group of the Yesso Survey, and nearly, if not exactly, of the same age. These are the most recent of the Japanese sedimentary rocks, alluvium excepted, and probably miocene, tertiary, or even more recent. Formed mostly of volcanic debris, containing in many places layers of pumice, etc., and broken through by dikes and interstratified and overlaid by beds of volcanic rock, the conditions of deposition, etc., were not favorable to the development of animal life, and fossil remains are not abundant. Evidences of vegetable life in the shape of beds of lignite, etc., are more common. According to Mr. Lyman, in Echigo the oil-bearing strata are in part apparently older than those of Yesso, and perhaps cover the gap there observed between the Toshibets group and the Norumui Coal group.

Petroleum is found here and there in small quantities in the rocks of this group over a very large area. The deposits of oil, however, are apparently always local and of small extent, even in the oil regions, and in most cases the quantity of oil is not sufficient to warrant working except on a small scale, and by the simple and inexpensive methods already described.

Oil bearing strata are found in Southern Yesso at three places: On the northwest coast of Nippon in Awomori, Akita, Yamagata, and Niigata Ken; and in the same belt, in Nagano Ken in the middle of the island, and in Shidzuoka Ken on the southeast coast.

The more important oil regions of Japan are those of Niigata Ken (old Province of Echigo). From Mr. Lyman's report I compile the following table, giving the characteristics of the different oil regions of this Ken, beginning with the northwest:

Oil Region.	Area in square miles.	Number of producing wells.	Total yield in barrels daily.	Average yield in gallons from one well daily.	Deepest productive well. Feet.	Largest yield in barrels from one well daily.
Kurokawa Oil Lands	*0·05	28	4	1·4	120	0·4
Kanadzu Region	25	105	1·7	·7	120	0·6
Miyokoji-Kusodzu Region	40	178	4·6	1·0	732	0·5
Matsuyama-Tateno Region	180	188	15·7	3·0	690	1·2
Other Oil Regions in Echigo	..	22	..	..	..	..
Totals	..	522	26	2·0	732	1·2

In the same province are five or six other localities of less importance, some of large extent, within which are numerous exposures of oil-bearing rocks, with traces or small quantities of oil and more or less abundant outflows of gas. In many places this gas is utilized in the houses for cooking and lighting, and arrangements are usually made in the village to exhibit for the amusement of the traveler the wonderful burning gas to the best advantage. At one place the gas is used to heat the cold water of a neighboring mineral spring for baths; at another to heat a rude still used for refining the petroleum. The gas is burned from bamboo nozzles, making a large, smoky, and unsteady flame.

The oil of the two northern regions of Echigo comes from the soft sand and clay rocks, and the wells are as a rule shallow; while in the two southernmost regions the oil is found in the somewhat harder shales underlying the clay rocks, and the wells are in many cases quite deep. The oil of the north places is thick, heavy, and colored, while that of the southern localities is lighter and yields more illuminating oil. This difference may be due to a slow evaporation of the oil in the softer and more porous rocks of the northern fields, and at the same time to the shallower depths reached by the wells. Mr. Lyman conjectures that the softer rocks may have thickened towards the north, replacing to a certain extent the shales which may have thinned out in that direction, and thus that the oil-bearing strata may be identical or of nearly or quite the same age in each case.

The oil-wells are sunk wherever the oil appears in springs at the surface, usually where the oil-bearing bed or beds have been brought near the surface by the erosion of the overlying strata, generally on a saddle or one or another side of a basin. The dips are often quite steep, so that the oil beds quickly sink too deep to be reached by wells, making the productive belt narrow.

In Nagano Ken (formerly Shinano Province), which also came within the limit of Mr. Lyman's surveys, there were but three places which yielded as much as eight gallons per day. The rest of the numerous oil wells reported proved to be quite insignificant, often mere traces of oil or only gas; sometimes a mere smell of gas, hardly to be located, or vague reports of a former outflow of gas. In this connection a statement in the Japanese Official Catalogue becomes interesting: "It is said that after the earthquake twenty-nine years ago, the oil springs were considerably modified, both the yield and the locality of the springs being affected."†

In closing this imperfect sketch of a very interesting report, a word should be said of the remarkable zeal, energy, and devotion to the performance of his duty exhibited by Mr. Lyman. Early in the season he suffered a painful accident by a fall from his horse, injuring the nerves of one of his legs so that it was impossible for him to walk or ride during the remainder of the season. Nevertheless he continued at work, directing from his bed the different topographical parties; sketching out their work, and receiving their reports. To this confinement also we owe the completion of a batch of reports on the coal fields of Yesso, and a final report on the geology of that island.

As soon as possible, probably sooner than prudent, Mr. Lyman rose from his bed, mounted an improvised sedan chair, and so carried on men's shoulders, traveled from place to place during the remainder of the season; visiting the oil wells of different regions, and from his elevated position sketching the topography everywhere as he went along. The Japanese government is certainly to be congratulated on having a servant so devoted.

* *Geological Survey of the Oil Lands of Japan—Report of Progress for the First Year.* Benjamin Smith Lyman, Chief Geologist, etc. Tokio. 1877.

* "A few hundreds of yards long and still less in width"

† *Official Catalogue, Japanese Section, Philadelphia Exhibition*, page 44.

THE VALLEY OF THE COLORADO RIVER, AND ITS GEOLOGY.—XVII.*

METHODS OF EROSION.

In this and the foregoing chapter, I have attempted to describe the agencies and conditions which have produced the more important topographic features in the Valley of the Colorado. These features are mountains, hills, hog-backs, bad-lands, alcove lands, cliffs, buttes, and cañons. The primary agency in the production of these features is upheaval—*i. e.*, upheaval in relation to the level of the sea, though it may possibly be down-throw in relation to the center of the earth. This movement in portions of the crust of the earth may be by great folds, with anticlinal or synclinal axes, and by monoclinal folds and faults.

The second great agency is erosion, and the action of this agency is conditioned on the character of the displacements above mentioned, the texture and constitution of the rocks, and the amount and relative distribution of the rains.

In a district of country the different portions of which lie at different altitudes above the sea, the higher the region, the greater the amount of rainfall, and hence the eroding agency increases in some well observed, but not accurately defined, ratio, from the low to the high lands. The power of running water, in corroding channels and transporting the products of erosion, increases with the velocity of the stream in geometric ratio, and hence the degradation of the rocks increases with the inclination of the slopes. Thus altitude and inclination both are important elements in the problem.

Let me state this in another way. We may consider the level of the sea to be a grand base level, below which the dry lands cannot be eroded; but we may also have, for local and temporary purposes, other base levels of erosion, which are the levels of the beds of the principal streams which carry away the products of erosion. (I take some liberty in using the term level in this connection, as the action of a running stream in wearing its channel ceases, for all practical purposes, before its bed has quite reached the level of the lower end of the stream. What I have called the base level would, in fact, be an imaginary surface, inclining slightly in all its parts toward the lower end of the principal stream draining the area through which the level is supposed to extend, or having the inclination of its parts varied in direction as determined by tributary streams.) Where such a stream crosses a series of rocks in its course, some of which are hard and others soft, the harder beds form a series of temporary dams above which the corrasion of the channel through the softer beds is checked; and thus we may have a series of base levels of erosion below which the rocks on either side of the river, though exceedingly friable, cannot be degraded. In these districts of country, the first work of rains and rivers is to cut channels, and divide the country into hills and, perhaps, mountains, by many meandering grooves or water-courses; and when these have reached their local base levels, under the existing conditions, the hills are washed down, but not carried entirely away.

FIG. 38.—THE GRAND CANON, LOOKING WEST FROM TO-RO-WEAP.

With this explanation I may combine the statements concerning elevation and inclination into this single expression—that the more elevated any district of country is above its base level of denudation, the more rapidly is it degraded by rains and rivers.

The second condition in the progress of erosion is the character of the beds to be eroded. Softer beds are acted on more rapidly than the harder. The districts which are composed of softer rocks are rapidly excavated, so as to become valleys or plains, while the districts composed of harder rocks remain longer as hills and mountains.

Where the beds are of stratified material, so that the change from harder to softer materials is from bed to bed, rather than from district to district, and in a vertical or inclined direction, rather than a horizontal, the topographic features which I have described as hog-backs and cliffs of erosion are produced. The difference between hog-backs and cliffs of erosion is chiefly due to the amount of dip or inclination of the beds.

But there is another condition necessary to the production of cliffs and hog-backs in their typical forms. The country must be arid; for, where there is a great amount of rainfall the water penetrates and permeates the rocks, and breaks them up, or rots them—to use an expression which has been employed with this meaning—and the difference between the durability of the harder beds and that of the softer is, to some extent, compensated for by this agency; though, doubtless, ridges and cliffs may be produced in less arid climates, as we find them in the Appalachian system, but not so well marked. In a region of country where there is a greater amount of rainfall, the tendency is to produce hills and mountains, rather than plateaus and ridges with escarpments.

Now, let us examine the character of the channels which running streams carve. Where the rocks to be carved are approximately horizontal, and composed of stratified beds of varying thickness, the tendency is to cut channels with escarpments or cliffs; but if the beds are greatly inclined, or composed of unstratified material, the tendency is to cut channels with more flaring and irregular walls. These tendencies are more clearly defined when the meteorologic conditions are favorable—that is, if a stream cuts through stratified rocks in an arid region, and carries the waters from a district more plentifully supplied, the cliff character of the walls is increased; and where a stream runs through unstratified rocks, in a district well supplied with rains, the walls or banks of the stream are cut down in more gentle slopes.

For purposes of discussion, it will be convenient to call the deep channels of streams through table-lands, in arid climates, cañons; and the deep channels of streams through heterogeneous beds, in a moist climate, water-gaps, or narrows, and ravines.

Having in view the forms which are produced by erosion, it will be convenient to classify the methods of erosion as follows: First, corrasion by running streams, and second, erosion by rains; the first producing channels along well defined lines, the second producing the general surface features of the landscape.

Of the first class we have two varieties:

A. The corrasion of water-gaps.

B. The corrasion of cañons.

Of the second class we have three varieties:

A. Cliff erosion, where the beds are slightly inclined, and are of heterogeneous structure, some soft and others hard; and for the production of the best marked forms the climate should be arid. Here he progress of erosion is hiefly by undermining.

B. Hog-back erosion, where the beds have a greater inclination, but are still of heterogeneous structure. Here the progress of erosion is by undermining and surface washing, and the typical forms would require an arid climate.

C. Hill and mountain erosion, where the beds may lie in any shape, and be composed of any material not included in the other classes; and the progress of erosion is chiefly by surface washing. The typical forms are found in a moist climate.

There is still another agency in the production of topographic features, viz., the eruption of molten matter from below the general surface. The beds formed are soon modified by ero-ion, and then the forms produced are due to that agency, and fall under the general series. But there is a time, immediately after the eruption, when these beds lie in forms due to igneous dynamics, and the most important features produced are cones. These cones are very conspicuous features of the landscape over much of the region drained by the Colorado River.

The district of country drained by the Colorado and its tributaries is divided into two parts by a well marked line of displacements. The lower third of the valley, which lies southward from this line, is but little above the level of the sea, except that, here and there, ranges of mountains are found. From this region there is usually a bold step to a higher.

The upper two-thirds of the area drained by the Colorado is from four to eight thousand feet above the level of the sea, with mountain ranges on the east, north, and west, of greater altitude. The bold step from the lower country to the table-lands is usually an escarpment in rocks of carboniferous age, marked, here and there, by beds of lava, and along its margin stand many volcanic cones, San Francisco Mountain is made up of a group of these beds of eruptive matter, covering stratified rocks. This higher region is the one to which we have given special attention in the previous discussion.

The principal condensation of moisture occurs on and about the moutains, standing on the rim of the basin, the region within being arid.

Bad-lands, alcove-lands, plains of naked rock, plains of drifting sands, *mesas*, plateaus, buttes, hog backs, cliffs, volcanic cones, volcanic mountains, cañons, cañon valleys, and valleys, are all found in this region, and make up its topo-

* Extracts from Report of Major J. W. Powell on *The Exploration of the Colorado River of the West*, Washington, 1875.

graphic features. Mountains, hills, and small elevated valleys, are the features of the irregular boundary belt.

No valley is found along the course of the Colorado, from the Grand Wash toward the sources of the river, until we reach the head of Labyrinth Cañon. For this entire distance the base level of erosion is below the general surface level of the country adjacent to the river; but at Gunnison's Valley we have a local base level of erosion which has resulted in the production of low plains and hills for a number of miles back from the stream. North of the Cañon of Desolation, and south of the Uinta Mountains, another local base level of erosion is found, so near to the general surface of the country that we find a district of valleys and low hills stretching back from Green River, up the Uinta to the west, and White River to the east, for many miles. North of the Uinta Mountains a third local base level of erosion is seen, but its influence on the topographic features is confined to a small area of two or three hundred square miles. Going up the chief lateral streams of the Colorado, we find one or more of these local base levels of erosion, where the streams course through valleys.

Where these local base levels of erosion exist, forming valley and hill regions, the streams no longer cut their channels deeper, and the waters of the streams, running at a low angle, course slowly along, and are not able to carry away the products of surface wash, and these are deposited along the flood-plains, in part, and in the valleys, among hills, and on the gentler slopes. This results in a redistribution of the material in irregular beds and aggregations.

In this region there are occasional local storms of great violence. Such storms may occur in any particular district, only at intervals of many years, possibly centuries. When such a one does occur, it reopens great numbers of channels that have been filled by the ordinary wash of rains, and often cuts a new channel through beds which have accumulated in the manner above described. The structure of these beds is well exposed, and we find beds of clay, beds of sand, and beds of gravel, occurring in a very irregular way, due to the vicissitudes of local wash; and where the progress of erosion has been more or less by undermining, larger fragments or boulders are found, and these boulders are sometimes mixed with clay, and sometimes with sand and gravel. And where thin sheets of eruptive rocks have been torn to pieces, more or less, by undermining (for such is the usual way in this country), the beds appear to contain erratics; and, in fact, some of the rocks are erratics, for, in the various changes in the levels produced, they have often been transported many miles—not by sudden and rapid excursions, but moved a little from time to time.

Again, the beds from which they were derived, doubtless, in many cases have been broken up or lost, and these fragments only remain to attest to the existence of such beds in some former time; and all stages may be observed from the beds the edges only of which have been broken up, to those that have only fragments remaining, or have entirely disappeared. Another interesting fact has been observed, that these erratics, or boulders, are often found distributed somewhat in lines, due to the undermining of lines of cliffs. Often, where we have cliffs capped with a bed of lava, former and more advanced positions of these lines of cliffs can be recognized by the position of lines of lava fragments which are seen in the valley or plains in front of the cliffs.

It will be seen that these local accumulations of material, due to the excess of erosion over that of transportation, greatly resemble the accumulations of "the Drift." Especially is this true where I have studied the latter, in the Valley of the Mississippi; and I have been led to query whether it may not be possible to refer the origin of the Drift of the Valley of the Mississippi, in part at least, to some such action as this; not that I question the evidence of extended glacial action in that region, but may it not be that this glacial action has only resulted in somewhat modifying a vast accumulation of irregularly bedded material originally due to the fact that the grand base level of erosion had been reached by the running streams of that region, and hills and mountains had been degraded by having the material of which they were composed scattered over lower lands, without being carried away by streams to the sea?

All the mountain forms of this region are due to erosion; all the cañons, channels of living rivers and intermittent streams, were carved by the running waters, and they represent an amount of corrasion difficult to comprehend. But the carving of the cañons and mountains is insignificant when compared with the denudation of the whole area, as evidenced in the cliffs of erosion. Beds hundreds of feet in thickness and hundreds of thousands of square miles in extent, beds of granite and beds of schist, beds of marble and beds of sandstone, crumbling shales and adamantine lavas, have slowly yielded to the silent and unseen powers of the air, and crumbled into dust, and been washed away by the rains, and carried into the sea by the rivers.

The story we have told is a history of the war of the elements to beat back the march of the lands from ocean depths.

THE MECHANICAL TREATMENT OF METALS.

By Prof. R. H. Thurston, in the Metallurgical Review.

(*Concluded from page* 313).

11. *The Dean Process.*—The result of coldworking bronze has been determined in the United States by Mr. S. B. Dean, and in Europe by General Uchatius of Vienna, in the manufacture of bronze ordnance. General Uchatius casts guns made of a bronze containing 8 per cent. of tin and 92 per cent. of copper, in chills, and then forces steel plugs, each 0·05 inch larger than the preceding one, through the bore by hydraulic pressure. The diameter of the bore is thus enlarged from 3·2 inches to 3·88 inches, and its hardness becomes equal to that of gun steel. Experiments have proved the excellency of these guns, and their manufacture has become well established at the Austrian ordinance works.

12. *Frigo-Tension* is the name given to a process for increasing the elastic limit of resistance of a metal by subjecting it to a gradually increasing strain applied steadily or intermittingly. This method may be usefully applied at ordinary temperatures to the increasing of the elastic resistance, and possibly ultimate strength of *ductile* iron and steel, and such other metals, as exhibit an elevation of the normal elastic limit by the intermittence of strain.

The process has been used to a limited extent by bell-hangers when wishing to give wire greater stiffness and uniformity of stretch.

Prof. Thurston divides metals used in construction into two classes: the first, including iron and steel, and possibly all magnetic metals when subjected to gradually increasing strain, show the phenomena of frigo-tension; the second, or "tin class" (including copper, zinc, and their alloys), cannot be thus improved, but break without elevation of the normal elastic limit and at the point of primary minimum resistance.

13. *The Elastic Limit defined by the Strain-Diagram.*—All the processes described in the foregoing involve some method of elevation of the elastic limit, and this may be represented graphically by a diagram plotted automatically or otherwise from tests of a piece of metal, in which the ordinates represent the distorting force, and the abscissas the distortion produced at every instant from the commencement of the distortion up to the point of rupture. The curve produced approximates to a parabola, and may be expressed by a similar formula.

14. *Methods of Varying the Elastic Limit.*—The form of strain-diagram obtained may be made to vary with the kind of test adopted, and will be characteristic not only of the peculiar qualities of that piece of metal, but also of the manner in which its test was conducted in the production of gradual distortion.

15. *Definition of the Elastic Limit.—Its Modification.*—The limit of cohesion, or original apparent elastic limit, Prof. Thurston defines as that point at which the rate of distortion, under gradually increasing loads, suddenly changes, and a set corresponding to these loads ensues. The *normal elastic limit* is defined as that shown on the strain diagram of a piece when broken by a regularly increased distortion, and as corresponding to the point of rupture. (It is not very clear what Prof. Thurston means here.) This may, by special treatment, be exalted or depressed at any point in the strain diagram, and is affected detrimentally with iron and favorably with metals of the tin class by a *rapidly* applied distortion.

16. *Comparison of Methods.*—The effects of the several methods of working which have been described can be well explained and illustrated by a comparison of the strain-diagrams of the product of each.

17. *Historical—Discovery of Facts and Determination of Laws.*—The first intelligent statements of the simpler facts were made, probably, by Galileo in 1656. Robert Hooke, in 1676, announced the principle that extension is proportional to force. Dr. Thomas Young defined the modulus or coefficient of elasticity, and named and defined the quality still known as "resilience" to be a measure of the "work" done in distorting a body. Navier, in 1824, published the first treatise on strength of materials, but Tredgold had previously prepared his work on iron. Since that date Fairbairn, Hodgkinson, Morin, and Wood have written valuable treatises on the subject. The first extended experimental researches were made by Muschenbroek, an account of which was published in 1762. Banks followed in 1803, Rondelet in 1814, and later Fairbairn, Hodgkinson, Kirkaldy, Styffe, Bauschinger, Wohler, Rodman, Wade, Shack, etc. The fact of the existence of an elastic limit was discovered early. Duleau, in 1820, places it for wrought iron at 8,540 lbs. Tredgold noted the same fact in 1823, but Coulomb had many years previous noticed that many materials take a permanent set long before the breaking point is reached. Emerson, as early as 1758, asserted that materials used in construction should not be subjected to a force exceeding from one-third to one-half their ultimate resistance. Dr. Young, in 1807, remarked that "a permanent alteration of form limits the strength of materials almost as much as fracture." He also pointed out the importance of the determination of the resilience of a piece as a measure of its power of resisting impact. Tredgold gave, in 1823, simple rules for the application of this principle. Hodgkinson's experiments were published in 1840 in the *Philosophical Transactions*. His work is still quoted as standard authority. Clarke, in his account of the Britannia and Conway bridges, in 1850, calls attention to the increase of strength of a beam by straining it previous to its use, and gives tabulated results of bars thus treated. Werder, at Munich, in 1854, used tie-rods which, by a single effort of tension, had been stiffened. The exaltation of the normal elastic limit by intermittence of strain and by lapse of time at a constant distortion were observed by Prof. Thurston and Commander L. A. Beardslee, U. S. N., in 1873. Gen. Morin, in 1850, was probably the first to make use of graphical representations of strain. Since that date Mallet, Major Wade, Kirkaldy, Styffe, and Gen. Rodman have all employed the graphical method; finally, in 1873, Gen. Thurston made use of automatically produced strain diagrams.

18. *History of Processes of Working Metals.*—The securing of homogeneousness of structure by various methods of fluxing the molten metal has been practiced from a very early period. Phosphorus for bronze and ferro-manganese for steel are examples of the most successful application of fluxes. Sir J. Whitworth, in 1860, first introduced the compression of molten metal. It was applied to bronze in 1867 by Col. Lavroff. Chilled-cast bronze was probably first proposed by Mallet in 1856. Gen. Uchatius adopted it in 1873, and Col. Rosset, of the Italian artillery, in 1874. The early history of the working of metals at a red heat is unknown. Cort introduced the rolling-mill in 1784. Wire was made by hammering by the ancients, and wire drawing was invented 500 years ago in Nuremberg by a "wiresmith," named Ludolf. Coldworking, as a system, has been practiced but a comparatively short time. Cold rolling was introduced in the United States by Bernard Lauth, about 20 years ago, and applied to the rolling of iron at the American Iron Works, Pittsburg. It was, probably, first applied to the second class of metals by Mr. Sam. Dean, of Boston. Gen. Uchatius adopted the process in 1873, and somewhat later Col. Rosset advised its adoption.

19. *Conclusion.*—We may conclude, from what has preceded, that the proper method of preparation of metal, to secure a maximum value for construction, is the following:

1. Reduce the metal to the molten condition, and flux thoroughly to remove all deleterious substances with which the metal may be contaminated, and prevent the formation of blow-holes.

2. Cast the metal under heavy pressure, in order to secure maximum density. If the metal is an alloy liable to liquation, cast in a chill.

3. If the metal is either iron or steel, produce any considerable change of shape at a full-red heat, and by rolling, the drop-press, or hydraulic forging. Let the product remain unused as long as possible, to permit the internal strain to relieve itself. If stiffness and a more perfect elasticity are demanded, finish by coldworking.

4. Bronzes, and other metals of the inelastic and viscous class, may be given considerable modification in form by coldworking. Precaution must, however, always be taken, in the coldworking of any metal, to avoid destruction of continuity, and thus, by the production of incipient fracture, permanently and seriously injure it.

A. F. W.

ENGINEERING IN THE TURKISH EMPIRE.

By Edward M. Grant, Bucharest, Roumania.

As this article will be a species of medley bearing upon many different subjects, I find it exceedingly difficult to select a title which shall be appropriate to the subject matter. As "Engineering" is a very elastic term, and the Turkish Empire occupies rather a prominent place at present in the eyes of the civilized world, I have endeavored to extricate myself from the initial difficulty of naming my literary progeny by coupling the two together, trusting that a lenient public will not scrutinize too closely the relationship between the contents of this contribution and its imposing title.

As very little is really known of the mineral resources of the Turkish territory, I am beset by two difficulties—one of them being an impulse to launch out into a diffuse description of the aforesaid resources, in the confident belief that no one would be able to contradict or correct me, and the other, the want of ma-

terials with which to build up a respectable article. No one needs to be informed that the Turks nominally govern a large extent of territory, part of which (Servia and Roumania) has secured a practical independence; but it may not be so generally known that the Balkans and their spurs contain iron, coal, copper and lead ores, and that similar mineral deposits have been found in the Carpathians, which form the boundary between Roumania and the Austrian territory. Gold is said to be found in both these ranges; but if it has ever been really discovered, the explorers have carefully held their peace, waiting for the internal affairs of these countries to get into a condition where mining operations might be properly protected. The peasants in the Balkans carefully cover up any outcrops of mineral veins, for fear the Turkish landlords may find them, and compel the aforesaid peasants to labor in the mines without wages—a condition of affairs not particularly conducive to the development of mining enterprises.

Servia contains rich deposits of coal, iron and copper, and also lead; but, as no Servian has money enough to open and work a mine, or will trust his countrymen enough to combine with them to form a company, the prosecution of mining does not form a prominent feature in Servian industry. No foreigner can hold real estate in that enlightened country; therefore, the introduction of foreign capital is attended with insurmountable difficulties. Any person proposing to the Servian cabinet to open a mine or railway is immediately asked to deposit a few hundred thousand dollars in the hands of the treasury department as a guarantee of ability and good faith. Several years ago, an English company did make a deposit of $50,000 for the above purposes, and they now offer twenty-five per cent. of the amount to any one who will extract the sum again from the Servian money vaults. They might even make a greater show of liberality by offering ninety-five per cent. without endangering their present financial resources. Servia may, therefore, be left out of the discussion of mineral resources of the Ottoman Empire. In Roumania, the laws against foreigners are not so stringent as in Servia, but there is an article in their "Constitution" which prohibits any person or persons "colonizing" in the country. As the importation of a "colony" of the skilled hands necessary to any mining or manufacturing enterprise is thus unlawful, and the working natives are too lazy and stupid to be taught the necessary rudiments of a skilled labor organization, there is very little inducement for foreigners to attempt the development of the industrial resources of the principality. Coal sells here at from $10 to $12 per ton, and not a ton is mined in the country. They have the richest salt mines in the Europe, but they are a government monopoly, and do not export enough salt to Turkey to pay for the lime brought from Bulgaria into Roumania across the Danube. The Italians actually send salt here, made by the evaporation of sea water. Two beet-root sugar factories have been established in the principality; but they are in a languishing condition. The fact is, as soon as the Roumanians have given a foreign company any concession for an industrial enterprise, they at once feel themselves seized by two powerful emotions: one is envy that they did not have the energy to start the thing themselves, and the other, the desire to hamper the operations of the newly-formed company in every possible way, so as to prevent its reaping any advantages from its hard-won concession. This concession is often obtained by bribery of the members of the government; and it is a curious fact that the worst persecutors of the concern are the very men who sold themselves to give the company its rights and privileges.

Roumania has 1,100 kilometers of railways, with some good iron bridges, and others which fall down when they see a respectable freshet coming down the rivers. The notorious Strousberg built most of these railways, and an English company built the rest. Justice compels the statement that one did just as good work as the other.

Turning to the Turkish Empire proper, or that part of it which lies in Europe, we find a perfect absence of everything like enterprise of any kind. A few straggling railways, most of which end in "nowhere," have been constructed with foreign capital, which has been sunk hopelessly in the operation; but no other sign of modern progress can be discovered in the country.

In Bosnia, a few open fires are worked for making charcoal blooms, which are reheated and hammered out into flat bars. This iron is of very fine quality; but as the amount only suffices for the manufacture of native-made knives and swords, scarcely any of the product of these forges is exported from thep rovince. In Heraclea, in Asia Minor, there is a government coal mine; but no other mine is worked to any extent. No attempt to utilize the mineral resources of the Balkans has ever been made, although it is well-known that foreign geologists have discovered rich veins of coal, iron, and copper, while whispers of the existence of more precious metals have often been circulated in the Orient. But the Turkish system of internal government is such that no encouragement or protection can be guaranteed to a company proposing to open and work mineral veins; and, therefore, the development of these resources of the Turkish Empire must await a change of administration, under which peace and prosperity may be insured to all.

To sum up; there is not a blast furnace in the whole Turkish Empire. Although Servia and Roumania are practically free and independent, not a pound of iron is manufactured in either principality. With the exception of the few open fires previously mentioned, the Turks produce no iron whatever. It may be readily conceived that from such a state of affairs there is not much material to be obtained for an article in a scientific journal.

The soil in all the territories of Turkey in Europe is exceedingly rich, but badly cultivated; notwithstanding which, the landscapes present a wonderfully prosperous appearance to the eye. The agricultural implements are of the most primitive character, consisting principally of wood. Even the plows are knots of trees pointed with a little piece of iron. Cattle and sheep exist in abundance. The chief products are wool, hides, barley, wheat, and Indian corn. There are no fences or inclosures of any kind in the East; and this gives the landscape a free and open appearance, entirely wanting in the countries where fences and hedges are in use. Every herd of cattle or sheep is tended by a shepherd or shepherdess, to prevent their depredations upon the cultivated fields. Fuel is very scarce all over Turkey, and that used in the towns and thickly populated districts is brought from a long distance. This makes the failure to work the coal mines all the more remarkable. The country people all live in villages, and there are no scattered houses dotting the hills and valleys. The reader will now have some idea of the general features of the Turkish territory, and of the total absence of anything resembling mining engineering operations. Mechanical and manufacturing engineering are represented by the two or three sugar factories in Roumania. There is nothing in Servia beyond a few steam flouring mills, and in the other portions of the empire there are simply the small establishments actually needed to enable the inhabitants to live in their simple way.

Naval engineering is confined to repairs upon the machinery of steamers built in foreign countries; and these repairs are generally carried on under the supervision, and sometimes by the labor, of foreigners. Road engineering is represented in Servia by several well constructed turnpike roads, leading from Belgrade to the various strategic points on the frontier, viz., Alexinats, Krushevats, Uchitza, Negotin, and Shabatz on the river Save. In Roumania there are several excellent roads leading from Bucharest to the principal towns of the principality. Many of the bridges on these lines of roadway are of iron, built by English firms in tubular or other antiquated forms of design. In Turkey proper there are some excellent roads, especially in the Balkan districts, where much skill has been displayed by the foreign engineers employed in laying out these works.

Military engineering occupies by far the most important position in the Turkish Empire of all the technical arts, although it is affected by the lethargy which spreads like a pall over everything in the Moslem dominions, except upon exceptional occasions, like the present, when the energy and fanaticism of the people are aroused by the pressure of the Russian invasion. In consequence of this lethargy, fortresses are allowed to fall into decay, and important strategic points are left undefended by fortifications in time of peace. Therefore the Turks are never ready for war when it comes upon them, and the lives of their desperately brave soldiers have to pay the forfeit for the neglect of their engineers in peaceful years.

When the Turk builds fortifications he generally does it exceeding well. The field works constructed since the present war began are well built, and when he has time the Moslem revets his parapets with turf, and finishes the angles and crests with a neatness worthy of a permanent fortification in New York Harbor. The batteries and redoubts in the Shipka Pass now held by the Russians were built by the Turks, and I never saw neater specimens of field military engineering. Their defenses are generally well placed. I was, however, surprised to see them lose the battle of Lovcha, simply because they had placed their strongest redoubt upon a hill having a bluff on one side, and had built no flanking works to sweep this bluff. Hence the Russians gathered under this bluff, out of range of their fire, and quietly worked up within a hundred yards of the redoubt before being exposed to fire. The consequence was inevitable. A sudden rush and the Russians were over the parapet, and the garrison killed or wounded, as they refused to surrender. At Plevna the Turkish fortifications are exceedingly well placed; and I never saw better use made of natural features of ground for defensive purposes. The redoubts are defiladed so that the fire from the surrounding heights encounters a parapet in every direction, while the intervening rifle pits are a snare to the assaulting enemy. The old permanent works at Widdin, Silistria, and Rustchuk, are not in very good repair; but the modern field-works constructed outside the old walls are very strong. The same remarks apply to all the Turkish fortresses. It is evident from this hasty sketch that there is an immense field for engineering talent and energy in the present Turkish dominions, should the government ever attain an efficiency of administration which will afford the requisite protection to engineering enterprises.

LECTURES ON MINING.—No. LVII.

By Prof. W. W. Smyth, M. A., F. R. S., Royal School of Mines, London.

DIVISION OF MATERIAL.

The material brought from the mine having been spalled and divided into several classes by means of riddles of a somewhat similar kind to those used in collieries, or of Rittinger's drum, we have next to consider into what various classes it may be desirable to divide the material. The number of divisions and the names applied to them vary much in different mining districts, but we may conveniently consider them as six different classes.—1. Prill (*Stuf-erz*), the best division, which will not require anything further to be done to it to fit it for the purpose of the smelter, except perhaps to be broken up; the equivalent North of England term for this class is bing ore.—2. Best dradge ore (*Aufschlag-erz*), which is mixed with a quantity of stone, etc., and will require to go through some process of comminution; it is a moderately rich class, which may be worked without machines, by a hand process.—3. Second class of dradge ore (*Walz-erz*), which is only suitable to be dressed by some comminuting apparatus, such as we have to look at to-day.—4. Stamped stuff (*Poch-erz*), of which, in a large mine with varied products, it will be advisable to have two different kinds, the second variety being called by the name of—5. Halvans (*Berg-erz*).—6. Deads, or attle (*Berg*), the material to be thrown away. This latter name does not mean that the material is absolutely free from ore, but that the quantity it contains is so small as not to be worth while dressing. Having made these divisions, we come next to consider the way in which we have to deal with them. A great deal of the successes of the mine depends on the judgment of the management in selecting a suitable spot for a dressing floor. It is quite obvious that it ought to be on the same level as, or perhaps a little lower than, the level of the main outlet of the mine, in order that the stuff may not have to be dragged up to a greater height. A second point of great importance is to select the ground so as to get a gentle slope, which will admit of being laid out in a series of steps, in which a water wheel, turbine, or similar machine, and dressing apparatus can be placed. There may be a first range for the better classes of ore (Nos. 1, 2, 3, which will be treated of in the present lecture), a second one for the inferior classes, and usually a third for dealing with what is called slime, or matter held in suspension, beyond which there should be space enough and fall enough to place slime pits in which a greater part of the material, which would otherwise flow into the stream, may accumulate. In continental districts there is commonly a great deal more building in connection with these places than in this country, in consequence of the greater extremes of climate.

We may look first at the processes to be adopted for comminuting the ore. With the prills the process will depend very much on the form in which it presents itself. Very often the breaking of it up by hand will be sufficient, but when the quantities are large we may have recourse to the crusher, taking care, however, to work it by itself, so as not to get it mixed with inferior classes of ore. In districts where the ore and matrix are not very hard, as in limestone districts, a great deal is done by hand. This is done with spalling hammers, which, according to the nature of the material, will weigh from 6 to 8 pounds, or with very hard capels or ironstone may be much heavier, going up sometimes to 18 pounds. In the matter of breaking the ore with picking hammers, and sorting it at the same time, the Germans are, as a rule, in advance of us, and they lay great stress on it, because of the very mixed class of ore they have. Although many substances are associated with tin ore, they are generally not capable of being extracted by simple comminution and picking, but all has to go into classes 4 and 5 as tinstuff. In the case of copper ore it is frequently noticeable that you may get pieces of lead or other ore of a size capable of being readily picked out by hand, after being struck off with a blow from the picking hammer. Obviously it will be a very great advantage to separate the materials as much as possible in this manner, thereby avoiding the expense and trouble separating these portions in after processes. The class of hammers used this purpose varies a great deal; a very general form is that represented by

common cobbling hammer (short handled, the head being a comparatively long bar of iron, curved, and with the convex side towards the hand, and with rectangular ends). The people working them are ranged at long tables, with cast-iron or great slabs of stone on which to lay the ore to be struck, sometimes called knocking stones. In some districts of Wicklow, where the rocks show a tendency to slaty cleavage, the people are in the habit of guarding their fingers by placing an iron ring round the ore. More or less cubical fragments of lead are picked out by this means, and thrown into a division by themselves, are sold to the potters as potters' ore, and fetch a much higher price than they would among the ordinary ore. This is only one instance of the importance of picking the ore carefully, and making as thorough a separation of it as circumstances will allow. The best portions of the ore thus separated may go to the prills and will require no further treatment, the remainder will go to one of the inferior classes for further operations. The lads employed in these picking operations (who are, it may be remarked, as healthy a set of lads as you can find anywhere, notwithstanding the notion that some theoretical people have that they are cruelly used, and ought not to be allowed to be so employed) get a most valuable training, which stands them in good stead when they afterwards come to engage in the more active underground work. The further breaking up of classes 1 and 2 will be done with a bucking iron—a flat plate of iron, with a loop at the back, into which a handle is wedged. These hand arrangements, though kept up here and there in small mines, would obviously be insufficient to meet the demands of mines where they have to deal with a great quantity of stuff. Consequently machines of various kinds have to be used, and some of these may now pass under review. Over and over again it has been proposed to employ the simple tilt hammer, lifted by arms from a wheel, and aided in its descent by a strong spring. As a general rule, from its throwing about the stuff in all directions, it has not been thought a suitable apparatus, and is not used now. Many substitutes for it have been proposed—Nasmyth's hammer, and other steam hammers; and these have been largely used in some parts of the United States, especially in Lake Superior district, but we are not in possession of sufficient details as to expense, wear and tear, etc., to enable us to form a conclusion as to their value. An instrument now used largely in this and other countries is that which was brought forward under the name of Blake's stone-breaker. It is made excessively strong; a strong bed of cast-iron, slightly inclined (the angle of inclination being adjustable by the means of some arrangement, such as a screw), and supported against a strong pillar; a movable piece of iron, which moves through a small distance, crushes the pieces of stone against the iron bed, and then allows them to fall between. The pieces thrown in will be from 6 to 10 inches diameter, the number of blows being 120 to 150 per minute. The material falls through partly as powder, partly as small fragments, the size of which may be to a great extent regulated by the amount of opening you give between the lower ends of the plates. In some cases this machine cannot be used advantageously; it has been found to give too large a proportion of powder as compared with the more expensive process of hand spalling. An arrangement should be attached, by means of which a stream of water, or other contrivance, should separate the material which passes through, and give you two or three divisions. As a general rule, this machine can be regarded as a preliminary to some processes to be referred to subsequently; they get through an amazing amount of work, and must be very highly spoken of. If, as sometimes occurs, the men take a pleasure in throwing everything into the machine without any kind of assortment, because they see how easily the machine breaks these things up, material which might have been separated by picking and kept separate, will all be mingled up together, and this may involve extra processes at a subsequent stage, which may take days to perform.

Of other machines several have been applied with success where the material has to be brought down to a small size. For example, the edge-rolls have not unfrequently been applied—a circular bed plate, with a couple of millstones connected by a horizontal axis set to run round the bed. The rubbing edge is generally a band of iron, as is also the bed. This sort of grinder can deal only with small quantities, and as there is a rubbing action, as well as a rolling action, some of the material is ground down to an impalpable powder. Such powder may be very suitable for certain things, but where you want the ore in small fragments, in order to separate it by specific gravity, it is very unsuitable. Such machine may be useful where an amalgamation process is to be carried on, and is seen under a slightly different form in the Mexican arrastra, and sometimes in our own country, for the powdering of flints. Instead of the millstones there are two long cross axles, with a heavy block of stone hung at each end, these blocks being the rubbing agents. In the North of Italy some machines of these kinds, but of an improved character, may be seen in use for the purpose of grinding down and amalgamating the gold ores of those districts. In the dressing of tin ore there is one department where a product is obtained which is somewhat too coarse to go on dressing with, and is at the same time so fine that you can scarcely expect to get it finer with the ordinary stamps arrangements, so that some kind of pulverizer has long been a desideratum. Several have been proposed. Mr. Dingley brought out one somewhat after the principle of the arrastra, a number of which are now working in the tin mines of Cornwall, but it is a question whether these processes may not yet be very greatly improved. Some years ago a notable success was achieved for a very short time only by a machine brought from across the Atlantic by a Mr. Berdan. A large cast-iron basin, somewhat inclined, was made to revolve, and the rubbing was done by two loose balls inside it, one weighing 24 cwts., the other about 9 cwts. A committee of the Society of Arts examined it, and pronounced it the most satisfactory machine that had ever been devised for grinding and amalgamating the ores. The miners did not like the look of it, but some of these amateur critics gave such a high tone to their report that a company was formed. No doubt the machines were capable of doing good work, but the amount they could do, compared with some machines at work in the mines, was very small. The inventor and his assistant obtained gold out of everything that was sent to them, gossan, granite, &c., all yielded about 1 ounce of gold to the ton, but when these two had returned across the Atlantic none of these materials could be found to contain gold at all. The lecturer was not aware that any of these machines were still in existence, though some curious relics of them might have been seen in North Wales some time ago. A similar machine was introduced about the same time by a person of the name of Britton, and may be seen at the present time at work in the neighborhood of Dolgelly extracting gold from the ores. In this a sort of pestle is worked round inside the basin by means of a crank movement from a water-wheel. These machines are not capable of getting through a large quantity of work, but for prills or the second-class they may answer very well. In some of the continental and Colorado mines, dry stamps are used for particular classes of ore, and a good deal of dust is produced, but beyond this there is not likely to be much loss.

We come now to a construction which has done good service to ordinary copper and lead mines—the crusher. The lecturer had not been able to ascertain the name of the inventor of this machine, nor the precise date of its invention, but it suddenly made its appearance in the neighborhood of Tavistock in the early part of this century. The crusher consists essentially of a pair of rollers, which are mounted on a strong frame and rub against each other. The main points to notice are these—first, there are two cheek pieces or frames of cast-iron 5 inches to 6 inches high, resting on a strong beam, the whole length of the frame being 7 feet; near the ends are strong uprights about 1 foot high. The rolls are fitted into the frame by the intervention of a couple of plummer blocks; the blocks on one side being fitted permanently close to the upright, those on the other being movable to allow of adjustment of the distance between the rolls. The rolls are made to revolve towards one another by a suitable axis or shaft, usually direct from the water-wheel if the wheel is on a small scale, or by means of gearing if a different velocity from that of the wheel is required. A lever 8 feet long with a weight at its end is centered to an arm from the upright adjoining the movable block, and one arm of it is connected with this block. In case of a piece of iron or steel getting in between the rolls, instead of smashing everything to pieces, it will merely force the rolls apart by lifting the weight at the end of this lever. The great peculiarity of these rolls is their proportion, and this has been brought about only by experience. It is found advisable to shorten them considerably, and to increase their diameter, being commonly from 2 feet to 30 inches diameter, and in some instances 36 inches or 37 inches, the breadth at the same time being not more than 10 inches or 12 inches. The form has been varied here and there; at the great Devon Consols they have found it advisable to put in rolls of two different breadths, 34 inch rolls, one 22 inches, the other 24 inches broad, the reason assigned being that this is the best way possible of meeting the wear and tear, which with even the best cast-iron is very great, and gives rise to the necessity of frequently changing and renewing them. The rolls consist of three parts, a square shaft, an outer solid piece of cast-iron called the core, and outside that the shell. The latter is usually of cast-iron, sometimes chilled, and after it has undergone a certain amount of wear it is removed from the core and another put on.

In Germany and on the Continent generally they have taken to employ strong springs to keep the rolls in sufficiently close contact (instead of the levers described above), and the lecturer did not find they were open to the inconveniences which had often been asserted attended the use of springs. One great point to be decided is the velocity which should be given to the rolls to get the best work from them, and another whether water should be allowed to pour down between them to keep them cool, and to assist their action. In the case of many of the lead ores derived from strata of clay-slate a great quantity of the veinstuff is apt to make up a very adhesive clay, and to clog the rolls, so that water cannot very well be used. In the case of quartzose material it is a very good addition. The speed must be varied according to the character of the material; it may be taken as from 30 to 80 feet per minute of the circumference of the rolls. The quantity of ore which may be crushed to a convenient state may be said to vary from 5 tons to as much as 15 tons per hour. The material passed away from the crusher sometimes is allowed to fall direct into an inclined sieve. That which is small enough passes through into a trough, and is carried away by a stream of water, or into a wagon if it is necessary to keep it dry. That which does not fall through is raised up again to the crusher floor, sometimes by an arrangement of scrapers worked by the water-wheel. There may be a pair of upper rolls with strong teeth, from which the stuff may pass to a second pair of rolls with smooth surfaces. The great difficulty is that, from the variable nature of cast-iron, the surfaces wear unequally, and it is difficult to grind the whole down minutely and equably. On this account the next step desirable after the grinding processes has brought the ore down to a small and moderately equable size is the dividing it into classes, and treating each class separately.—*London Mining Journal.*

OUR SOUTHERN MINES.

Our exchanges from the Southern mining districts all speak encouragingly of the outlook, and the active developments now going on in the mines of the Gold Belt.

Of mining in Georgia, the *Dahlonega Signal* says: "The Auraria Mining Company is moving the Battle Branch eight-stamp mill to their location near Auraria, and will have it in operation in a few days. Mr. Williams, of the Auraria Company, informs us that they have now nearly a thousand tons of ore ready for the mill. In the progress of their hydraulic operations they have opened up several very rich veins, notably the Nix vein. They have also uncovered about thirty feet of a very large sand vein. This company is the only one in this section using steam and pumps exclusively. We find they work their cuts by direct discharge from the pumps, so they are practically working out the problem. They have located their mine at the lowest point of their property, where they have two balance-wheel pumps of a capacity each to discharge 200 gallons per minute. These pumps discharge through 2½ inch pipes, laid up the hill about 350 feet separately, when they connect; and both streams are discharged through an inch nozzle into the bank. This concentrated stream is so powerful that it cuts the earth, slate and ore, and at the same time sluices the mass down a line of boxes to the mill—saving all the free gold in "riffles" on its way to the mill. A 35 horse-power boiler drives the engines, pumps and an 8 stamp mill on a pressure not exceeding 50 pounds to the inch, consuming from 1½ to 2 cords of wood per day. We do not design speaking of the value of this mine or its rich yields, but the ease and cheapness with which they dig, handle, crush and save the precious metal from the ore is of vast importance to all persons in any way interested in the development of the mineral resources of our section.

This company does all their work on less than 4 miners' inches of water, being able to cut away and sluice down enough ore in three or four hours to run the mill 24. The water is procured from spring branches on the property by a system of reservoirs that saves all that flows.

The Martin & McIntosh mill near Auraria has been worked sufficiently to compel an acknowledgment of its thorough success. This is a five-stamp mill, and runs day and night on ore from a large vein that pays well.

A change has been made in the White, Wood & Weaver copartnership, which was about to expire. Mr. Lane, of Cleveland, O., has bought the interests of Messrs. White and Wood, and will assume personal supervision. Their vein yields a world of ore that pays well.

The Sprague gold mine is located at Loudsville, White County. The Sprague is one of the old mines of the country, and has made some rich yields in times past. It embraces three veins, the oldest of which is called the Sprague vein, which in some former operations was worked to a depth of 101 feet. The present tunnel is 65 feet lower than the old one, and discloses a vein that has increased in size and richness till it is now a well-developed three-foot vein that shows gold nicely and pays well. The Sprague has a 20-stamp mill, but Mr. Ingersoll is only running five stamps at present, day and night.

Work on the Pigeon Roost Ditch is rapidly progressing, and will be soon completed. The new mill at the terminus of this ditch is being built. It will be a handsome mill when done, and will open up the rich veins of the Pigeon Roost. Col. Moore's little mill is doing well. Some fine machinery is being placed on the Williams purchase, and his new stamp mill will soon be crushing very rich quartz. Upon the whole, we have every reason to be pleased with the prospects before our mines. Parties who left their claims here years ago for the richer fields of California are now returning and looking up what they then thought to be of little value. New companies are being talked of, and everything connected with the mines at this place presents a lively aspect.

The Atlanta *Independent* of the 11th inst. says: The Hand Company, in Lumpkin County, with its big ditch, is washing down the sides of the mountains, exposing the rich veins of quartz ready for the stamps. This company has been enjoined in cutting its new seven-mile ditch, by which a great many veins could be worked. Water is the great want, and the injunction should be removed. Small miners are working the branches in Lumpkin, Hall, and White counties with good results. Sluicing is at its height when there is plenty of water, and the great rains causing a rush of waters uncovers the shining yellow metal.

The Nacoochee Mining Company has a hundred yards of riffle four feet wide in Duke's Creek, and is working on the Colorado mining system. The company is taking out a great deal of rich ore, and are having a 20 stamp mill built by Porter & Meakin, of Atlanta.

Virginia Gold Mines.—The *Norfolk Landmark* says: We were recently shown several specimens of gold ore from the Garrett and Moseley mines of Buckingham County. The specimens were very rich, one piece no larger than a man's fist containing by estimate no less than $12 worth. Colonel Wood informed us that $1,000 worth of gold had been procured from one bushel of ore taken from the same veins.

The *Wykoff Gold Mine* is located in Fauquier County. A correspondent to the Washington (D. C.) *Gazette* says of this mine:

This property is an extensive tract, containing about 800 acres, one half of which is heavily timbered with pine and oak, and very suitable for lumber and fuel. The surface, though somewhat broken in places, is gently undulating, and well-adapted to plantation purposes, both in the general contour and quality of soil.

There is probably no other gold-mining section in the world which produces such fine crops, right where the gold veins exist, as in Virginia. The great staple, tobacco, finds a home here for its finest growth.

The geological features at the Wykoff present the same general characteristics that prevail elsewhere on the line of the "Gold Belt." The country rock is talcose slate, and the strata are nearly vertical. The decomposition of the rock forms the excellent soil referred to. There are several fine, large gold-bearing lodes, three of which have been prospected at different points.

The Mill-house vein is 20 feet thick, and has the appearance of carrying ore enough for a fifty-stamp mill. The cost of mining the ore from this mammoth lode should not exceed 50 cents per ton, to a depth of 150 feet, when the mine is properly opened. It is opened right under the mill building, and the hoisting could be done by the engine which drives the other machinery.

The Tunnel, some three hundred yards to the east, is a new discovery in the Wykoff, and measures eight feet between walls. The vein matter consists of quartz, slate, and brown oxide of iron. The ore from this vein can also be cheaply extracted.

Still further to the east is the slate vein, from two to six feet in width, carrying a large percentage of auriferous sulphurets with free gold.

I have made careful assays of samples taken by myself from these veins, with the following results: Mill-house vein, the yield was $41.28 per ton; Tunnel vein, the ore was the same value from the slate vein; the clean sulphurets gave $89.18 per ton; another vein, known only by its outcrop, the clean sulphurets yielded $624.10 per ton.

Besides the veins already prospected there are numerous outcrops at other points of a very encouraging nature, one of which contains copper pyrites, and yields $30 per ton in gold.

The following statement of the cost of mining in Virginia is the result of my own experience for the past three years as superintendent of the operations at the Ellis gold mine, in Culpeper County, and is corroborated by others in the same business. In every case where wages of men are given, it is to be understood that they board themselves, and the prices I have paid are as follows, per day, viz.: Common laborers, 75 cents; miners, $1 to $1.50; head miners, $2; carpenters, $1.25 to $2; masons, $2 to $2.50; pine wood delivered, $1.50 per cord; board, 35 to 40 cents per day.

Copper and Silver Discoveries in Georgia.—We note the statement that a very rich copper mine has been discovered in Paulding County, Ga.

The *Southron* says Mr. Jesse S. Thrasher has recently discovered a silver and copper mine near the Chattahoochee River, in Habersham County. The vein is exposed 25 feet and is very rich. The ore also contains gold and iron, as well as silver and copper.

The *Eagle* of the 26th ult. says silver is found in different places in Georgia. The Harris Mine, in Hall County, at a depth of forty feet, showed ores of an assay value of $77 per ton. The ore is an argentiferous and auriferous galena.

Alabama Gold Mines.—A recent number of the Montgomery *Advertiser* says the gold works erected some time since in Tallapoosa County, Ala., have been crushing rock for two weeks past. The proprietors have been washing for gold, and they say that the yield is greater than their most sanguine hopes had led them to expect.

North Carolina Gold Mines.—It is claimed in Raleigh that there are now eighty-one gold mines in operation in North Carolina. They are turning out to be more remunerative than was expected.

THE FRUE VANNING MACHINE OR ORE CONCENTRATOR.

Staff Correspondence of the Engineering and Mining Journal.

[WITH SUPPLEMENT.]

This machine is now very generally known, at least by name, in the various mining districts of the United States; and during the past twelve months has been introduced pretty largely into some few sections. The machine has already been described somewhat in detail, in the pages of this JOURNAL; and in the present paper it is merely intended to touch upon the work already accomplished, and in so doing indicate the class of work for which in future the vanner is likely to be generally adopted. It may be well, however, to state again, in a few words, the principle of working.

The dressing surface consists of a flanged rubber belt, slowly revolving against the descending stream of sand and water, and receiving a continuous lateral vibratory or shaking motion, which keeps the whole volume of water and sand in gentle movement. This side motion of the belt, the vanning, is the important feature of the machine; and, in connection with the perfect surface of the rubber belt itself, is the real element of the success of the vanner on fine slimes. The Brunton belt in England, and the Hoffman in Germany, are known as slime dressers; the first is merely a self-discharging inclined plane in principle; the last, receiving in addition a succession of blows, is an improvement on the former, being an intermediate stage between it and the present vanning machine. The difficulty of making the belts last in the Hoffman machine was, according to the statement of the well known manufacturing firm at Kalk, near Cologne, the reason of the belt dropping out of use. In the vanner no such difficulty occurs; the belt is of long duration, the only appreciable wear being caused by the attrition of particles of ore passing over its surface with the water; and this wear, which is slight, is remedied by the occasional application of a liquid rubber paint. That the lateral motion is in itself preferable to percussion few practical dressers will deny.

There are two forms of vanners in use; the single and the double. The first is a belt 27 feet 6 inches long and 4 feet wide, supported either in bearings or on toggles, within a stout wooden frame; both the side motion and revolving of the belt being run from a single pulley on the crank-shaft. In the second form, two belts are placed side by side, their supporting frames being bolted together and slung from above by iron rods; and both belts receiving motion from the same crank-shaft and driving drum. The belts are in this case generally 33 feet 6 inches long by 4 feet wide. In the accompanying beautiful engraving the arrangement of the double machines is shown from a sketch by our artist, Gen. F. L. Vinton, of the Everitt & Company's Mill on Four-Mile Creek, Boulder County, Colorado.

In the mill above mentioned, the machinery consists of a 25 horse-power engine, Blake's crusher, two Tulloch's automatic stamp feeders, 10 stamps, and two double vanners, *i. e.*, 4 machines, fed from a classifier below stamps. This mill, as also seven others fitted with the vanners in Boulder County, is for the concentration of the low grades of tellurium ore. The average capacity of the mill is from 13 to 15 tons in 24 hours. The ore treated has varied in value from $10 to $100 per ton; where it carries tellurides and is worth $20 or $25 per ton it pays well for freighting to the mill and for concentration. The average value of concentrations produced has been about $2,000 per month from actual sales to smelters. The value of the concentrations per ton varies of course with the value of the original ore, and percentage of base minerals (mostly iron pyrites), some being as low as $50, others running up to $900 per ton. From the water tanks in which the collected mineral is deposited by the revolving belt, there is a gentle overflow of water into long settling boxes, in which settles the finely divided mineral suspended in the water. This "float mineral," as it is called, when working on regular tellurium ores, amounts to about 1 lb. per ton of ore treated, and is worth from $1 to $3 per lb. Assays made on "tailings" or waste from the tables vary from $2 to $4.40 per ton. Five men, including two engineers, run the mill day and night; with water power three hands would be sufficient. In Boulder County there are now 28 machines either at work or in course of erection; not including two lately destroyed by the burning of Carvell's Mill.

It may probably excite the surprise of those acquainted with the usual systems of concentration elsewhere in use, to hear of an ore being stamped to a fine grain, run direct over a single machine, and then allowed to flow off as waste; but a little consideration of the character of tellurium ores will show the necessities of the case. In the low grade ores there is a fine impregnation of iron pyrites throughout most of the gangue, with intermixed fine patches and minute particles of the tellurides. A coarse crushing on such a rock is almost useless, for the mineral is not thereby separated from the particles of rock. The various tellurides of gold and silver, by reason of their state of division and brittleness, are not easy minerals to concentrate; but they can be and are saved by proper care. A higher percentage than most of the mills attain could undoubtedly be saved, by the use of a second machine to treat the tailings of the first; and, considering the nature of the ore, and the usual systems of dressing in use, no one would consider the use of two machines under a battery of stamps, as a reflection on their effectiveness as concentrators. The millmen, however, seem satisfied with single machines; and the miners who really have anything in their ores send them down regularly to the mills for treatment. One mine in this way sells concentrates of the value of $1,000 per month from ore previously worthless.

At Nederland, Boulder County, eight of the vanners are being put in place to treat the gold ores of the district after passing over the usual copper plates below stamps; the loss of gold from using plates alone being very high.

In the San Juan district five machines are at work; three being in Crooke's works at Lake City, treating the "dust" refuse from Krom dry concentrators.

At the Silver King mine, in Arizona, silver ore from $100 to $300 per ton has been worked. The first vanner put in for trial yielded in 40 days' running of 24 hours, 22 tons of concentrates assaying $1,600 per ton, and working up to 90 per cent. of the assay value. This is an exceptionally fine ore to treat, and three more vanners are now being put in place. The ore is, in this case also, stamped directly on to the machine.

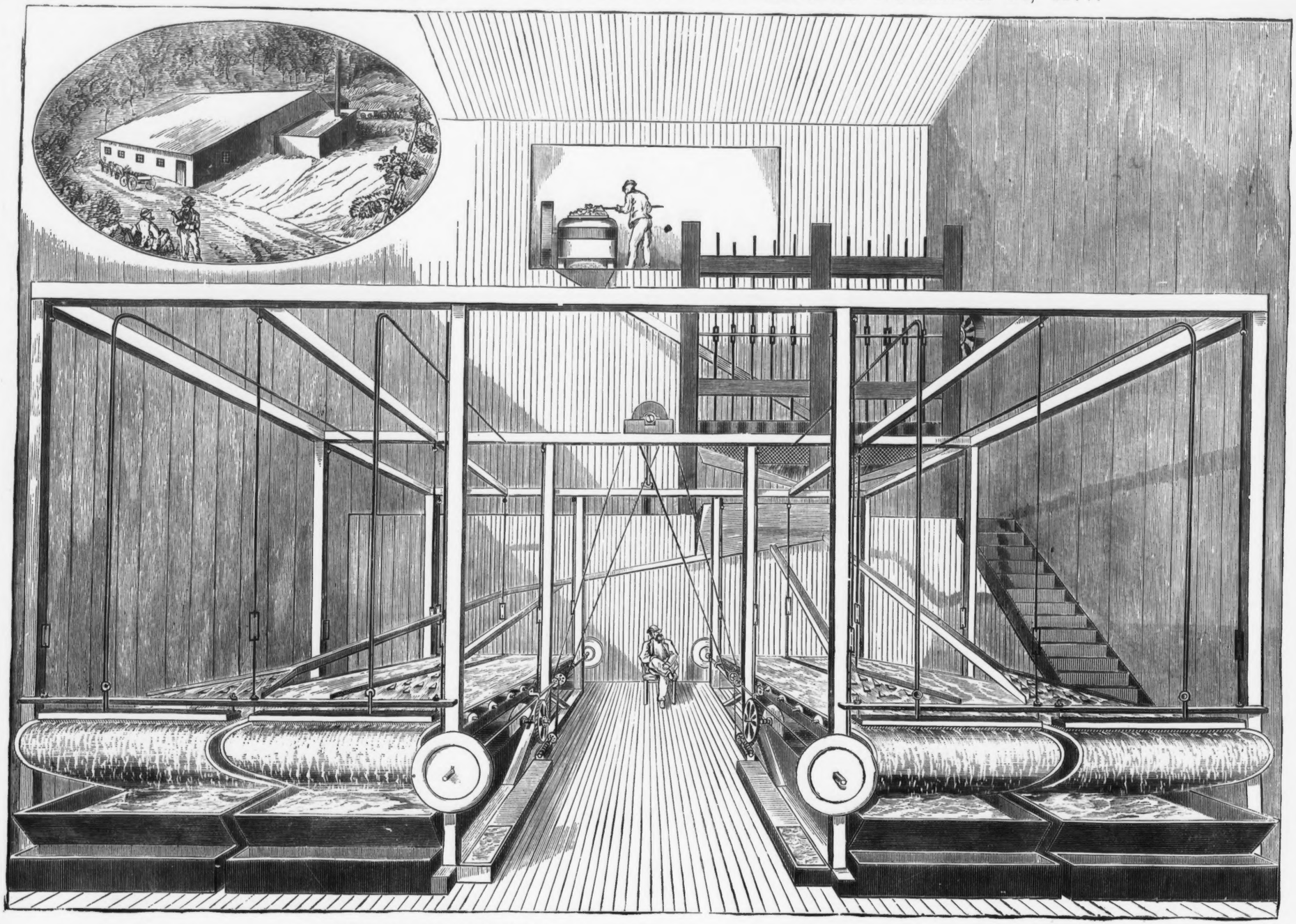
The black auriferous sea sands of Oregon have lately been worked with marked success. In the first experiment at San Francisco, one ton only of the sand was treated, assaying $8.27 per ton in gold. The concentrations yielded $1,935.47 per ton, the tailings showing only a trace on assay. The concentrate, though high compared with the original ore, was diluted by particles of sand passing over in the final cleaning up of the belt on so short a run; but in steady work much higher concentrates are produced. Seven machines were put up in Oregon as a commencement; and on the first run, after everything was in good working order, 320 tons of black sand put over six machines in six days yielded 3,400 lb. of concentrate. This concentrate was redressed and reduced to 100 lb. worth $6 per pound. It was then amalgamated and run into gold bar. The sand treated in this run was of a poor quality purposely worked, and served to show how low a grade could be made to pay. Since the sand has merely to be shoveled into cars and dumped into automatic feeders, and each vanner will treat from 10 to 12 tons in 24 hours, it will be seen at once how small a cost per ton is the treatment.

At Sulphur Banks, in California, six machines have been at work for over a year, concentrating the poor ores of cinnabar to a product ready for retorting into quicksilver.

Ores of gray copper and purple copper, disseminated through a limestone gangue, have been treated at the Liberty mine, Maryland; in one run, the original ore carried 2 per cent. copper, the concentrate 58 per cent., and the tailings 0·2 per cent.; on a second trial, ore carrying 2·3 per cent. copper gave a concentrate of 60·4 per cent., and tailings showed only 0·09 per cent.

At Mine la Motte, Missouri, one of the vanning machines is in use for working the lead slimes made in crushing for the jigs.

The first actual mill of vanners ever erected was that at the Silver Islet mine, Lake Superior. Here twenty machines in double row take the pulp from fifty



THE FRUE VANNING MACHINE OR ORE CONCENTRATOR.

EVERITT & CO.'S MILLS, FOUR MILE CREEK, BOULDER CO., COLO.

stamps, working regularly sixty tons per day; while four machines re-dress the concentrate from the lower vanners to make it of equal value with that from the first row of machines. Silver ore carrying only $8 per ton pays well for running in this mill; as, owing to the presence of native silver and but little base mineral, the concentrated ore runs very high. This mill is now idle for want of ore, the mine being very lightly worked; but it paid for cost of construction in a few months' running.

In the Marmora gold district of Canada the gold bearing arsenical pyrites is concentrated by the vanner, and the product shipped to Germany; the arsenic paying the shipping expenses.

There are also in Idaho, Nevada, and California, several machines from which no results have yet been made public. In Cornwall very excellent results were obtained in working various classes of tin ore; but, owing to the depressed condition of tin mining at present, and the difficulty in getting mine owners there to put capital into any change of machinery, that country has been neglected for the time being; although it can be demonstrated clearly that, in the presence of the competition from which Cornwall is now suffering, its future salvation consists in increased production of metal by labor-saving appliances.

In the treatment of the black iron sand of Oregon, the full effect and capability of the side shake in the vanning machine is most strikingly shown. Here is a coarse and heavy iron sand carrying minute spangles of free gold. The vibration of the belt affects strongly the coarser particles of sand, keeping them in quick motion, and therefore lightly suspended in the down-flowing water; while the fine flakes of gold sift down through the moving mass and, once touching the surface of the belt, are no more influenced either by the motion of the latter nor by the descent of water, but are carried up slowly by the moving bed and deposited clean in the collecting tank below. It is a generally accepted maxim in concentration, that the more uniform the size of particles in the matter treated, the better the separation effected. But a man skillful in the use of a vanning shovel—not a gold pan, which has a flange—will save cleanly nearly the whole of a mineral slime from an intermixture with quite coarse particles of rock. This is done by so regulating the motion of the shovel, as to take advantage of the greater influence exerted by the moving water on the coarse pieces of rock than on the fine mineral clinging to the shovel's face. In fact, the flow of water regulated in this manner will move coarse particles of mineral almost as freely as coarse particles of gangue, still leaving the finely divided mineral undisturbed on its bed: it is fully as much a question of surface exposed by the respective particles as of their specific gravity. This is the reason why the vanning machine has been able to save such fine mineral, from an admixture with comparatively coarse gangue: the side motion multiplying the effect of the flowing water on the coarser material, assisting the settling of the mineral to the belt, and yet not disturbing it when once settled. In certain classes of work, especially where quantity is an object, it seems even preferable to have rather coarse sand go over the belt with the "slimes," say, for instance, all that will pass a screen of forty holes to the lineal inch: the sand in this case forming a sort of bed, which, while tending to check the speed of the downflowing water, is not allowed to become so heavy as to interfere with the perfect settling of the fine mineral.* Of the quantity which a single belt is capable of working, exact figures can only be given for particular ores. As already stated, with the black iron sands one vanner can treat as much as twelve tons in twenty-four hours; but there are some impalpable slimes on which two tons in twenty-four hours would be fair work owing to the volume they occupy. In a number of cases five and six tons in a day is the usual work.

The modern German dressing works are wonderfully complete, and very effective on heavy mineral ores, but are not adapted to such ores as carry but finely disseminated mineral; and it is in the treatment of this latter class, and with jigs as auxiliary for the coarse ore, that the vanning machine is now coming into such prominence.

UTAH MINING NOTES.

Special Correspondence of the Engineering and Mining Journal.

THE LEEDS DISTRICT.

A camp, of which but little was known a year since, and which had a great deal of prejudice to overcome, is Leeds. This district lies in Washington and Kane counties, Utah, with the edge running into Arizona. This country forms a part of the sandstone plains, or mesas, of the Colorado River. Back of the towns of Leeds and Toquerville, these sandstones abut against the older rocks of the Pine Valley range. About five miles from the foot of these mountains a basaltic eruption has taken place, tilting up the beds of sandstone. The course of this eruption has been north and south, its effects covering a breadth of from five miles upward. In the mining district the center of upheaval seems to have been just to the north and east of the town of Leeds. Its results have been to tilt the sandstone beds immediately round, so as to form a horse-shoe opening to the south, the edges of the beds having been so eroded as in many cases to leave but low ridges, called reefs. The edges of these reefs show alternating strata of fossiliferous and non-fossiliferous sandstone. Of these, the first are silver bearing, the latter containing seldom more than a trace. The thickness of the fossiliferous strata decreases as you ascend, while the silver content increases. This is the rule as found in the main reefs, but does not hold good in the Buckeye Reef. The silver is very unequally distributed through the same stratum, being found only in certain localities and in masses, seldom in continuous veins. The deepest workings were upon the mines of the Leeds Mining Company, whose works had reached a depth of nearly 700 feet below the croppings, and showed in the bottom of the incline five feet or more of ore, the value of which, from $40 to $60 per ton, was about the same as at the top. Overlying the ore in this mine, as well as in others, is found a seam of clay much resembling steatite, and which I did not find on the surface. The silver occurs in the form of horn silver and native silver, and also in nuggets the size of a pigeon's egg, combined with red copper oxide.

The richest silver ores come from the upper part of the horse-shoe, where are located the Walker & Barber, Leeds Company's mines, Tecumseh, Buckeye, Stormont, Eliza Jane, and on the other side of the horse-shoe the Duffin mines. In many other claims good ore has been found, but in no considerable quantities as yet. The camp was for some time crippled for want of adequate milling facilities, but this has since been remedied. There are now thirty stamps in the camp, with a prospect of twenty more stamps going in. As confidence is gained, more work will be done upon other parts of the district, and the probability is that other good claims will be discovered.

* In other cases, as, for instance, the tellurium ores of Colorado County, better results are apparently obtained by a partial sizing of the pulp in pointed boxes, and running the separate grades on to different belts regulated as to pitch and speed accordingly.

BINGHAM CANON.

During the past week the owners of the Revere mine, in Bingham Cañon, made an assignment for the benefit of their creditors. The liabilities are above $50,000. The cause of the failure does not appear, since the mine is said to have considerable first class ore, besides large quantities of low grade ore suitable for concentration in sight. They have also had a contract for the entire output of the mine with the Pennsylvania Lead Company, so that the low prices paid for ore have not affected them.

The Emma mine has again become an ore producer, the upper part of the mine having been leased to Mr. Scrimgeour, who has been concentrating the ores.

Through an accidental explosion of giant powder in the Flagstaff mine, the hoisting works were disabled and work stopped. Repairs will be completed in a few days, and the mine will resume shipments.

The improved market in New York has brought prices up here. Morgan sold bullion to arrive at $1.20 per ounce silver, and $43 per ton for lead.

MINING NEWS.

Staff Correspondence of the Engineering and Mining Journal.

MONTANA AND IDAHO.

Helena Herald.—Shipments of bullion from the Helena U. S. Assay Office, for October, aggregated $62,170, of which $40,024 was in gold and $22,116 was silver.

The Helena Works, having made a three weeks' run of considerable success on one stack, are putting another into repair.

The Jefferson City Reduction Works are turning out bullion.

It is reported that the Hecla Consolidated Company have recently purchased for $60,000 the mines of the Bannack Mining Company.

Butte Miner.—Early in October, at a depth of 24 feet in the Gonyon claim, on the Original Lode, a very rich strike of argentiferous copper ore was made. A level was begun from the bottom, and driven on a 2½-foot vein of first class, which is paying from $500 to $800 per ton, besides which is a 3-foot seam of $100 ore. The ore is going to Baltimore. About 30 tons had been extracted, up to November 10, of the first grade, and 100 tons of the second.

It is reported that the Belmont Company, at Phillipsburg, will recommence work this winter.

Both the Phillipsburg mills are now running.

The Olin Concentration Works have, since August 1, dressed 450 tons of low grade copper ores, purchasing those running as low as 12 per cent., and raising them to 30 per cent. The produce is shipped to the Hecla Works, at Glendale. The latter establishment has just added a copper-smelting furnace to its plant, and will soon put up amalgamation machinery. This company has now a capacity of 50 tons daily.

The western level on the Stevens lode has reached a distance of eighty feet from the working shaft, and throughout its whole length free-milling ore of high grade has been found. At a low estimate, the ore between this level (42 feet deep) and the surface is worth $10,000. Last week, Mr. Stinson made an opening on his lode 500 feet east of the main shaft, and the new cutting shows a vein six feet in width, and of precisely the same kind of ore as that found in the main shaft. He is now about to open a level eastward from his main shaft, and, as the croppings between that shaft and the opening made last week can be continuously traced, and are found by assay to be of the same nature for the entire distance, it is probable that the developments made by the eastern level will be fully as satisfactory as those of the western.

Messrs. Dickey & Pike, who are working under lease the western 200 feet of Mr. Stinson's location on the Stevens lode, after striking water in their shaft at the depth of 50 feet, opened a level at that depth, toward the west, and found ore yielding about 100 ounces of silver, and from $15 to $30 in gold, to the ton, all the way to their western line, fifty feet from the shaft. They then opened a level toward the east, and for the first 70 feet found only ore similar to that in the western level; but last week the free-milling ore, similar to that found further east on the same lode by Mr. Stinson, was met with.

COLORADO.

Boulder News.—A drift eastward on the 100-foot level of the Ni-Wot mine has disclosed a new and rich body of gold ore.

Courier, Sunshine.—The Mountain Lion lode, at Magnolia, has been purchased at sheriff's sale, and will be immediately reopened.

The Hoosier mine, recently opened, is doing well.

The Carbonate Mines.—The mining excitement in California and neighboring gulches continues to grow in spite of the approach of winter. As the year draws to a close it is possible roughly to estimate the value of ore taken out and sold during the year, and to express some opinions on the future of the district. Partial statistics from the gulch indicate that not less than 4,000 tons of ore have been sold, of a gross value of about $100 per ton in lead and silver. Fully as much more has been taken out, and is now on the dumps, and it may be truly said that the exploitation of the deposit has but just begun. At least four of the claims have been developed into properties having a genuine value of $100,000 and upwards, each, judging by ore in sight, and a dozen more will reach the same condition early in the Spring, by reason of the work which will be done during the winter. The smelting works are now treating 30 tons of ore daily. The ore from these mines will average, according to report, not less than 40 per cent. in lead, and are so far the highest grade in silver of any lead ores yet found in the West, many of the lots running over $200 per ton, and some $500 and $1,000. As a full description of this enormous deposit of argentiferous carbonates will be presented to our readers as soon as complete details and figures can be obtained, further description will be deferred till then.

Register.—The tunnel being driven for the Saratoga vein has reached a length of 300 feet, and is being pushed ahead actively. Another 100 feet has yet to be driven.

The Alps & Mackey, under their new management, are improving rapidly as the work of reopening progresses; 595 stamps are now engaged in crushing ore in this district, handling about 400 tons daily, with a gold product of about $4,500, or nearly $1,400,000 for the year.

The Boston & Colorado Smelting Works are crowded with ore, handling from 50 to 60 tons of the higher grade minerals every 24 hours, much the larger portion of which comes from other districts. The silver export of these works for 1877 will approach $1,500,000, and that of gold $890,000. Another smelting furnace and several calcining or roasting furnaces have recently been added, bringing the capacity of the entire concern up to about 65 tons daily, instead of 52, as during the past twenty months.

The depths of some of the most prominent mines of this district are as follows: Briggs-Gregory, 900 feet; N. Y. & C. Gregory, 670; Ophir Bor-

roughs, 1,000; three other shafts on Borroughs, about 600; Bobtail, 740, 500, and 600; Monmouth-Kansas, 820; Gunnell, several shafts, 500, 600, and 700; Buell, 560; California, 740; Mackie, 490; Gregory Second, 550; Bates, 430; Gardner, 500; Kent County, 550:

The Briggs mine is showing better ore at and near the bottom of the 900-foot shaft than has been met with for the last hundred feet above. The mine and the 50-stamp mill employ altogether about 100 men. The New York and Colorado mine, adjoining on the same vein, employs about 60 men, and has shown some improvement of late. These two mines give a total yield of not far from $20,000 per month.

The yield of the Bobtail is still larger, and the working force generally exceeds 200 men. Two mills and 95 stamps are at work crushing the ore, of which about 70 tons are mined daily.

The Gunnell is worked in several localities. Nearly all of the present yield comes from the part owned by Fullerton, Mackay, Clinton & Co., whose mill gold alone generally amounts $16,000 monthly. Besides this, the picked ores sold to the smelter foot up quite a respectable sum. About 100 men are employed in the mine. Three mills and 68 stamps are employed in crushing the daily yield of fifty tons.

The Monmouth-Kansas shaft is being driven down through the richest large body of ore now mined in the county. The 52-stamp mill over the mine is kept busy. The yield for October was 146⅞ cords of ore, yielding $13,345.18; expenses, $9.009.71; profits, $4,335.47.

The Kent County keeps 37 stamps at work, and is paying large profits. The Comstock mine is getting into condition to repeat its handsome yields and profits of last winter and summer.

On Quartz Hill, besides the Kansas, Kent County, Burroughs, Alps and other veins, the Lewis, Shanks and Fourth of July are coming into notice by reason of their rich gold-bearing deposits, and all are steadily improving. The Lewis gives the unusual return of from 11 to 13 ounces of gold to the cord of rock, while its picked mineral sells to the smelter at from $150 to $250 per ton.

The five tunnels now being driven in the neighborhood of Central are all progressing satisfactorily, the Central City having just been started up again, and the Quartz Hill, over 900 feet long, let a contract not long ago. The German tunnel has penetrated Mammoth or Central City Hill 600 feet. The Centennial Tunnel continues to send out several loads of ore daily. The Belden Tunnel on the other side of Casto Hill is progressing with good prospects. The Ellery and Furnald vein is yielding very rich ore.

NOTES.

COAL of excellent quality, and in large quantity, has been obtained in South Africa, and at Grahamstown experiments have been made which prove that the coal forms good fuel for smith's work and steam generating purposes.

SOME interesting researches on the specific heat conductivity of several substances have recently been made by Herr J. Stefan, and communicated by him to the Academy of Sciences of Vienna. Taking the heat-conducting power of copper as 1·000, that of iron is given by him as 0·17; ice, 0·0057; glass, 0·0016; water, 0·0015; hydrogen, 0·00039; hard india-rubber, 0·00026; and air, 0·000055.

IN a recent part of the *Comptes Rendus*, M. E. A. Amagat describes a series of investigations on the compressibility of volatile liquids, when the liquid state was maintained by pressure at a temperature higher than their boiling point. The experiments were carried to a pressure as great as thirty-nine atmospheres, the results being in the most satisfactory accordance with deductions from the mechanical theory of heat.

WE are informed, says a contemporary, that the Belgian Government, after trying for some time fifty kilometers, or thirty-two miles, of Hilf's wrought iron permanent way, have been so much satisfied with the results, that they have just ordered another thirty-two miles of it. In Germany, the adoption of this system is making rapid strides, nearly 1,000 miles of it being either in use or in course of construction. One of the large English railway companies has ordered a trial mile.

PROFESSOR FRIEDR. KICK and Asst. Ferd. Polak, of Prague, have made experiments on the flow of plastic solids, which, however, cover only a small portion of Tresca's field, but which are neatly treated, and formulæ of deformation simply deduced. They conclude that the laws of deformation are the same for all bodies which admit of internal displacements through pressure. Some of their experimental results with clay may have important applications in geologic mechanics. —*The Engineer.*

A DESCRIPTION of a simple contrivance for the rapid cooling of liquids, invented by M. Toselli, is described in *Les Mondes*. It consists of a cylindrical cup, for holding any liquid, into which may be plunged an inner goblet, shaped like an inverted truncated cone, and having a lid which rests on the outer cup. Putting 150 grammes of nitrate of ammonia in the inner goblet, filling it with cold water, and stirring it so as to hasten the solution, the temperature of the outer liquid is soon reduced at least 12 degrees C.—22 degrees Fahr. The salt may be used for an indefinite period, by spreading it on a plate after each trial, and exposing it to the sun until it crystallizes anew. The inventor prepares a salt which will lower the temperature 28 degrees C.—50 degrees Fahr.—in the warmest countries.—*The Engineer.*

INDEX OF CURRENT TECHNICAL LITERATURE.

EXCHANGES.

[In this department will be given abstracts of the more important original articles contained in current technical periodicals at home and abroad.]

The following gentlemen have kindly consented to assist in making the reviews of current technical periodicals:

JOHN RANDOLPH, Mining Engineer, New York.
Prof. TROWBRIDGE, School of Mines, Columbia College, New York.
Prof. H. S. MUNROE, " " " " "
Prof. T. EGLESTON, " " " " "
ARTHUR F. WENDT, Mining Engineer, New York.
MANSFIELD MERRIMAN, Yale Scientific School, New Haven, Connecticut.
FRANKLIN GUITERMAN, Mining Engineer, Cincinnati, Ohio.
Prof. P. de P. RICKETTS, Ph. D., School of Mines, New York.
Prof. E. A. FUERTES, Cornell University, Ithaca, New York.

Engineering News, Chicago, September 15, 1877.—Detroit & Milwaukee Railroad Improvements. (Engineering expedients; use of "slab rafts" and sand at Grand Haven, in filling in marsh land; use of the same in carrying road across the Saddle Bag swamp, a deep mud-sink which had defied all previous attempts; "rafts" of 16 feet, "slabs" and "edgings" piled crosswise 10 feet thick, sunk with sand till solid foundation secured; use of old rails in culverts; liberal use of ties to prolong life of iron rails; fish-plates secured by tapering key instead of nut and screw, etc., etc.)....Railroads and their Use, V....Land Surveying in Canada, VI....The Metric Discussion, II....Lighting Railway Cars with Gas.

September 22.—Railroads and their Economical Use, VI....Land Surveying in Canada, VII. (Examination of applicants and list of Provincial land surveyors.) ....The Metric Discussion, III.

October 13.—Tile Drainage (a new opening for engineers)....Civil Engineers' Club (77th regular meeting)....The Recent Gulf Storm (and its effect on the gabionades and pile jetties at Galveston—but little damage done, channel deepened)....Method of determining the Direction and Speed of River Currents, S. T. Emerson, C. E. (Buoy of pine timber 3 by 5 feet long, submerged by cast iron washers secured by bolt and nut to lower end; short flagstaff in upper end, with tin cone; buoy dropped into river from a boat at varying distances from shore, its course down stream each time being determined by simultaneous observations, at intervals of 60 seconds, with two transits located at known points on the shore; convenient to have several buoys and as many boats; observations should be taken at high and low stages of the river, and varying action of currents studied; bridge piers may then be located to present least obstruction to current and to navigation.)

Supplement, October 13.—Shall the U. S. Testing Board cease to exist before its work is half done? (Special supplement to be sent to Congressmen by subscribers of the *Engineering News.*)

October 20.—The Wooden Pavement of Chicago. (Want of success attributed to bad foundation and inferior quality of wood used.)....Perth Water Works, Ontario (report of committee)....Arches; considered graphically (continued).

H. S. M.

Colliery Guardian, October 26.—Plan of Borings and Working of Coal at Warora, India, by W. Ness....Indian Railways (doing well)....Coal Produce of England and Wesphalia (in 1854, one twenty-third, now one-seventh).

November 2.—Old Rails (Increasing necessity of dealing with)....Our Future Rail Trade....Manchester Geological Society (Meeting of.)

Engineering, October 26.—Coquillon's Grisometer and Carburometer (for determining fire-damp)....The Aneroid (continued)....The Clausthal Lead Smelting Works, No. IV., by J. Clark Jefferson....American Iron and Steel Works, by A. L. Holley and Lenox Smith. (The Works of the Bethlehem Iron Company (concluded)....The Royal Naval College (description by W. H. White)....Indian Railways (description of)....Sea Sounding....The Paris Exhibition, No. V.... The Pennsylvania Railroad, No. XLIII (Standard Tender for Class I. Shunting Engines....Electric Experiments (Mr. Douglass's report on experiments with various systems.)

November 2.—Fixing Boiler Tubes....Notes on Gas Making. No. IX., by R. H. Patterson (Sulphur in London Gas)....The Pennsylvania Railroad, No. XLIV. (Rolling Stock)....Thirty-ton Steam Hammer (at Works of Sir Wm. Armstrong & Co.....The Douro Viaduct ...Thompson's Lantern Galvanometer.... The Paris Exhibition, No. VI....A New Dynamometer, by Wm. Froude.... Electric Illumination (conclusion).

A. F. W.

ASSAY DEPARTMENT OF THE ENGINEERING AND MINING JOURNAL.

This department is opened for the benefit of miners, prospectors, and others interested in minerals.

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ANSWERS.

ASSAYS.

Denver Office: T. F. VAN WAGENEN, Assayer.

All assays are reported in ounces per ton of 2,000 lb. The ounce of silver is worth about $1. The ounce of gold about $20. Lead and copper are reported in per cent.

264. F. D. W., Ward, Colorado.—No. 1 shows antimony, zinc, lead, arsenic, sulphur, iron, copper and silica. You may call it what you please. It is a mixture of a number of common minerals. There are two technical names for substances like this. These are "Conglomerate" and "Polybasite." If you *must* have a name for your rock, choose one of these. No. 2 is crysocolla, a combination of copper and quartz. It is a good ore of copper.

265. EDWARD FORD, Santa Fe, N. M.—The tests you ask for with the minerals sent require the use of the spectroscope, or rather cannot be made without that instrument, except through long and tedious wet analysis, which we are unwilling to make at no charge, having no spectroscope. We will make them, however, at a charge of $10 per metal. All the metals you mention are rare, occur only in minute quantities, and require great care for their detection.

266. J. W., Fairplay, Colorado.—The mineral is sulphate of baryta, commonly known as heavy spar and barites, and technically called "Barite." It is quite common, and is largely used as an adulterant for white lead in paint. For this purpose it should be quite white. It has then a considerable market value.

267. W. H. R., Colorado Springs, Colo.—Gold, ½ oz.

268. J. P. H., Mill City, Colorado.—Gold, 1 oz.; silver, 26 oz.

269. C. M. S., Ward, Colorado.—Gold, 2⅛ oz.; silver, 10 oz.; copper, 2½ p. c.

270. J. F. B., Laramie, Wyo.—Silver, 482½ oz.

271. L. S., Laramie, Wyo.—Silver, 1,298 oz.; copper, 16 p. c.

272. W. S. D., Denver, White Lode.—Silver, 93½ oz.; lead, 18 p. c.

273. H. T.—No. 1. Del Norte, Alps Lode. Gold, 2·1 oz.; silver, 2·2 oz. No. 2. Gold, 2·3 oz.; silver, 2·0 oz. No. 3. Gold, 1·4 oz.; silver, 2·5 oz. No. 4. Gold, 6·3 oz.; silver, 1·8 oz. No. 5. Gold, 0.5 oz.; silver, 2·7 oz.

274. PIONEER G. M. Co., Deadwood.—Gold, 3·3 oz.; silver, 6¼ oz.

275. L. B., Denver.—Silver, 147½ oz.

276. I. P. JUNIOR, Denver.—Silver, 102½ oz.; lead, 27 p. c.

277. JOHN YATES, Denver.—Silver, 54 oz.; copper, 6½ p. c.

278. SILVER SPRING LODE, Georgetown.—No. 1. Galena. Silver, 71 oz.; lead, 59 p. c. No. 2. Galena and gray copper. Silver, 1,238¼ oz.; lead, 18 p. c. No. 3. Quartz and gray copper. Silver, 901 oz.; copper, 11 p. c. No. 4. Concentrates. Silver, 4,246 oz. No. 5. Third class rock. Silver, 22 oz.; copper, 5 p. c.; lead, 2½ p. c. No. 6. Gangue. Silver, 10 oz. No. 7. Rock sample (specimen). Silver, 1,942 oz.; copper, 6 p. c.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Nov. 17, and years from Jan 1st.

Tons of 2,240 lb.	1877. Week.	1877. Year.	1876. Week.	1876. Year.
Wyoming Region.				
D. & H. Canal Co.	69,058	1,542,893	59,484	1,703,062
D. L. & W. RR. Co.	70,881	1,646,931	70,030	1,655,871
Penn. Coal Co.	31,290	902,456	30,910	951,945
L. V. RR. Co.	30,061	788,194	18,885	831,749
P. & N. Y. RR. Co.	775	38,550	718	21,259
C. RR. of N. J.	46,180	1,133,239	38,399	1,179,790
Penn. Canal Co.	17,715	323,696	16,479	393,909
	265,960	6,375,959	234,905	6,737,585
Lehigh Region.				
L. V. RR. Co.	64,981	2,056,400	98,254	2,475,453
C. RR. of N. J.	28,144	1,316,995	42,370	1,232,947
D. H. & W. B. RR.	....	25,987	1,135	38,447
	93,125	4,299,382	141,759	3,746,847
Schuylkill Region.				
P. & R. RR. Co.	123,737	5,961,666	171,799	4,326,223
Shamokin & Lykens Val.	16,434	639,822	21,583	852,791
	140,171	6,601,488	193,382	5,179,014
Sullivan Region.				
Sul. & Erie RR. Co.	565	17,469	355	29,448
Total	499,821	17,294,298	570,401	15 692,894
Increase	....	1,601,404	....	....
Decrease	70,580	....	....	....

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent of the whole production.

Receipts and shipments of coal at Chicago, Ill., for the week ending Nov. 17, and year from January 1:

	Week. Tons.	Year. Tons.
Receipts	44,803	1,483,813
Shipments	8,644	322,980

The Receipts of Coal at Rondout, N. Y., by the Delaware & Hudson Canal for the week ending November 22 were 307 boats, carrying 39,626 tons.

The shipments of coal at Cleveland, Ohio, for the week ending Nov. 19 were as follows: shipped coastwise, 7,894 tons; total for year, 265,444 tons; foreign shipments, 1,404 tons; total for year, 78,238 Total of coastwise and foreign shipments for week, 9,298: for year, 343,682 tons.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Pennsylvania, Railroads amounts to 135,714 tons, as compared with the corresponding period in 1876.

Perth Amboy business:

	Tons.
Received for the week	20,047
Shipped for the week	24,244
On hand Nov. 17	101,706

Shipments of coal at Pictou, N.S., for the week ending Nov. 17 and year from January 1:

	Week.	Year
To Canada	1,000	51,942
" United States	....	20,332
" Other Provinces	1,312	72,020
West Indies	363	1,989
Total tons	2,675	146.283

Receipts of Coal at Boston, for the week ending Nov. 16 and years from Jan. 1.

Tons of 2,240 lb.	1877. Week.	1877. Year.	1876. Week.	1876. Year.
From				
Alexandria and Georgetown	1,940	76,765	490	53,708
Philadelphia	11,104	618,114	23,335	540,130
Baltimore	1,830	139,706	2,719	135,049
Other places	4,880	228,582	4,740	260,951
Great Britain	1,595	12,682	....	5,039
Nova Scotia	926	38,017	1,677	24,496
Total	22,277	1,113,868	32,961	1 019,463

Coal Cleared on the Canals of the State of New York from Nov. 8 to Nov. 15 inclusive, and years since the opening of navigation:

Tons of 2,000 lb.	1877. Week.	1877. Year.	1876. Week.	1876. Year.
Anthracite	27,658	891,974	26,843	710,707
Bituminous	4,378	232,133	6,101	277,216
Total amount cleared	32,036	1 124,107	32,944	987,923
Of the above, there was cleared at tidewater ports, viz., New York, Albany, West Troy, and Waterford.	21.801	769,158	24,65[illegible]	450,853
Cleared at internal ports	10,231	354,949	8,28[illegible]	537,070

The production of Bituminous Coal for the week ending Nov. 17 was as follows:

Tons of 2,000 lb., except where otherwise designated.	Week, Tons.	Year, Tons.
Cumberland Region, Md.: Tons of 2,240 lb	36,035	1,325,874
Barclay Region, Pa. Barclay RR. tons of 2,240 lb	9,367	291,279
Broad Top Region, Pa. Huntingdon and Broad Top RR	3,802	122,225
*East Broad Top	1,141	44,809
Clearfield Region, Pa. *Snow Shoe	1.364	34,145
*Tyrone and Clearfield	30,407	1,148,079
Allegheny Region, Pa. *Pennsylvania RR	3,160	155,103
Pittsburg Region, Pa. *West Penn. RR	4,283	156,374
*Southwest Penn. RR	735	33.205
*Penn & Westmoreland gas coal, Pa. RR.	23,985	602,412
*Pennsylvania RR	8,328	323,400

* For the week ending Nov. 7.

The Production of Coke for the week ending Nov. 7.

Tons of 2,000 lb.	Week.	Year.
West Penn. RR	887	50,070
Southwest Penn. RR	11,914	531,674
Penn & Westmoreland Region, Penn. RR.	1,432	55,398
Pittsburg, Penn. RR	1,988	94,424
Total	16,221	731,566

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 23, 1877.

Anthracite.

Some of the companies are shipping coal as fast as they can get it to the ports, while others are filling all the vessels they can get. There is a large amount of coal moving, and a very good demand still continues. The cause of this activity is the near approach of the close of navigation, and the failure of certain dealers to supply themselves with such coals as were available in the market, preferring to wait for the Lackawanna coals, which they were accustomed to handle, and which, owing to the strike, were practically out of the market for a long time. The effect of this demand and the efforts to meet it will be to make a better market in this city and other open ports during December.

On Tuesday, the 27th inst., the Delaware, Lackawanna & Western Railroad Company will sell at public auction 100,000 tons of coal. The object in selling on Tuesday is to enable buyers to reach their homes by Thanksgiving Day. Owing to the near approach of the close of navigation, the announcement of this sale has had no effect on trade, as many buyers must have their coal now, and cannot take advantage of it. There is the usual discussion as to how prices are to go, the general opinion prevailing that they will advance. If the present demand could continue there would be no question that they would, but it is quite uncertain what the requirements of open winter ports will be, and without that knowledge a prediction is worth nothing.

It looks more and more as though we might be favored again with the announcement of an old-time meeting of the coal barons to discuss the much-worn subject—a coal combination. We do not believe such an organization will be established, although we must acknowledge the possibility, knowing, however, that the chances are greatly in the favor of our being right in our views. During the last two weeks there has been more discussion among the officials of the companies than since the formation in the Spring of the combination which did not go into effect. If this were a new and untried scheme there would be no difficulty in arranging some plan for operation; but with the sad experience the companies have had there will be strong objections on the part of one or more of the proposed members to nearly every detail offered. So far as we can learn the most prominent plan now is to limit tonnage and let prices take care of themselves. We should suppose that the first point in the details in this scheme would be, how much shall each company deposit as a guarantee of good faith? Now, this involves another important question—where will all the companies secure the neccessary funds to meet this requirement? The next, and most important point in this and all other combinations is, what percentage of business shall each have? It is quite evident already that this question is likely to be a rock upon which hopes will be dashed. Should these questions be settled a combination might be formed. Of course, by some means it would be expected that prices would be advanced. This would be repugnant to the public, who would make every effort to destroy the combination. Believing in its ability to do so, and knowing that in case it is successful, that lower prices must follow, the demand would decrease and continue of a hand-to-mouth nature for so long a time that some of the companies, through financial necessities, would be compelled to break the agreement. The probabilities are that some of the companies would sell all the coal they could bring to tidewater at such prices as they could get, and contract for as much more as possible; and then some other companies would be found trying to sell coal at unnatural prices, with empty order-books and large stocks of coal on hand. The result is plain: a disorganization and grand slaughtering of coal on the part of the outwitted companies.

We have frequently discussed this plan, and, if it takes more definite shape, will give it further attention.

The production of coal last week was but 499,821 tons as against 513,018 tons for the previous week, and 570,401 tons for the corresponding week of last year. The falling off occurs in the Schuylkill and Lehigh regions while there was an increase in the Wyoming. The loss in the Schuylkill is largely accounted for by a number of the mines being flooded, while in the Lehigh it is the result of too high tolls. The total production from January 1 to November 17 was 17,294,298 tons, as against 15,692,894 tons for the like period of 1876, showing an increase this year of 1,601,404 tons.

OFFICE OF LEHIGH VALLEY RAILROAD CO.,
LESSEES OF MORRIS CANAL.
JERSEY CITY, Nov. 19, 1877.

We will receive coal upon our Morris Canal for transportation until navigation is closed by the ice. Shippers, however, on and after the 24th inst. must take the risk of their cargoes being frozen in, and of any loss or damage which may result therefrom.

JACOB F. RANDOLPH, Supt.

The Scranton *Republican* says: "The Pennsylvania Coal Company has shipped, via the Lehigh Valley railroad, upward of 15,000 tons of coal to Western points. This is a new market for Pittston, and one that will result in giving more work for the men employed by this company.

Bituminous.

There is nothing of importance to note in the business for this kind of coal. Our reports of production of Clearfield coal are somewhat behind, but from such information as we receive shipments are not so active as they were. The Cumberland output is falling behind as compared with previous weeks, and the corresponding week of last year. A break in the Chesapeak & Ohio canal is reported, but it is thought that it will cause but little delay.

New York.

Wholesale Prices of Anthracite Coal f. o. b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Chestnut.	Stove.
Wyoming Coals.						
*Lackawanna at Rondout	2 65	2 65	2 65	2 80	3 05	3 10
†Pittston at Newb'g (A.S Swords)	2 70	2 70	2 70	2 80	2 80	3 00
‡Scranton at Hoboken	....	2 32	2 45	2 50	2 86	2 40
Wyoming at Amboy (L. V. C.Co.)	....	....	2 85	2 85	3 00	2 60
Wilkesbarre at Port Johnston	2 60	2 60	2 70	2 75	2 60	3 00
Kingston at Hoboken	2 50	2 50	2 65	2 70	2 60	3 00
Lehigh Coals.						
Sugar Loaf, at Hobok. & Amb	3 50	....	2 85	2 85	2 60	3 00
Lehigh at Perth Amboy	3 50	....	2 85	2 85	2 60	3 00
Hazleton at Hoboken	3 50	....	2 85	2 85	2 60	3 00
Lehigh Coal Exchange	3 50	....	2 85	2 85	2 60	3 00
Mount Pleasant at Hoboken	3 50	....	2 85	2 85	2 60	3 00
Cross Creek at Port Johnston	....	....	2 85	2 85	2 60	3 00
Lehigh at Amboy (L. V. C. Co.)	3 50	....	2 82	2 85	3 00	2 60

* These prices are for the city and harbor of New York. For all points on North River and north of Rondout the price is 15 cents less.

† These prices are for the city and harbor of New York. For all points on North River and north of Newburg the price is 10 cents per ton less.

‡ These quotations represent the average prices of the last auction sale.

Boats towed by the D. & H. C. Co. at its expense to and from New York Harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York	40c.
" " Elizabethport & Port Johnston to N. Y.	40c.
" " South Amboy to New York	40c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, South Amboy and Perth Amboy to New York City and vicinity 40c.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$5 50
" " at S. Amboy.	5 00	5 50
Kanawha at Richmond	4 10	5 40
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
Youghiogheny, Waverly Co., at Balt.	4 50	5 65
Despard, West Va.	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	5 85
Fairmount, West Va., " "	4 40	5 70
Newburg Orrel, Md. " "	4 50	6 00
Cannelton Cannel, West Va.	....	10 00
" Splint " at Richmond.	6 00	7 00
" Gas Coal at Richmond	4 00	5 65
Peytona Cannel W. Va. at Richmond	....	10 00

Manufacturing and Steam Coals.

Cumberland at Georgetown and Alexandria, Va.	2 85@3 10	4 35@4 50
Cumberland, at Baltimore	3 10@3 25	4 35@4 50
Clearfield f. o. b. Canton, Baltimore	3 25@....	4 35@4 50

Clearfield "Eureka" and "Franklin" at mines per ton 2,000 lb. 75c.; f.o.b. Baltimore and Philadelphia per ton of 2,240 lb., $3.25; f.o.b. South Amboy, $4.25; alongside at New York, $4.50.

Foreign Gas Coals.

	Sterling.	Am. cur'cy
Newcastle, at Newcastle-on-Tyne	8/6@10/6	5 50@ 6 00
Liverpool House Orrel, at Liverpool	25/	13 00
Ince Hall Cannel "	35/6	18 00
" Gas Cannel "	25/6	10@10 50
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S.	1 75	4 50
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 60	4 25
Lingan, at Lingan Bay	1 75	....
International mines at Sydney	1 75	4 50
Pictou, Vale mines, at Pictou	2 00	4 70

Retail Prices

Anthracite.

Per 2000 lbs.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, delivered	$4 50	$4 50	$4 50
Lack. coal, delivered below 59th St.	4 00	4 00	4 00
*Wilkes-Barre, delivered	4 25	4 50	4 00
*Lehigh and Locust Mountain, del'd.	4 25	4 50	4 00

* These prices are for coal delivered below Canal Street The prices for coal delivered above that point are 50c. per ton more.

Bituminous.

Delivered, per ton of 2000 lb.

Liverpool House Orrel,	$18 00	American Orrel	$11 00
Liverpool House Cannel	18 00	Red Bank Cannel	7 00
American "	11 00	Cumberland	9 00
Cannelt'n Block, or splint	10 00		

Boston. Nov. 17, 1877.

Coal is steadier and if anything a trifle firmer, on account of the advance in freights.

We quote Boston wholesale prices as follows:

Anthracite, broken	$4 25@4 40	Cannel, English	$16 00
do. egg	4 25@4 40	do. Buckeye	10 00
do. stove	4 50	Lingan	4 50
Cumberland	4 80@5 00	Pictou	4 75
Clearfield	4 55@4 75	Penn	5 00@6 10
Westmoreland	6 00@6 10	Youghiogheny	6 00@6 10
Caledonia	4 25		

—*Commercial Bulletin.*

Buffalo, N. Y. Nov. 21, 1877.

Specially reported by C. M. UNDERHILL.

The following are the prices of Lackawanna, Scranton, Henry Clay and Black Diamond coals, per ton of 2,000 lb. for Buffalo local trade for the present.

	To Dealers.			To Consumers.
	F. O. B.	On car or boat.	In yard, screened,	Delivered at Retail.
Grate	$4 45	$3 95	$4 15	$5 20
Egg	4 45	3 95	4 15	5 20
Stove	4 70	4 20	4 40	5 45
Chestnut	4 60	4 10	4 30	5 35
Blossburg	4 00	3 85	4 35	5 00

Chicago, Ill. Nov. 20, 1877.

Specially reported by Messrs. RENO & LITTLE.

Retail prices of coal delivered per ton of 2,000 lb.

Lackawanna Stove	$6 75	Erie and Brier Hill	$5 50
" Chestnut	6 75	Wilmington and Ill. 3	50@4 00
" Grate	6 75	Blossburgh	6 50
" Egg	6 50	Piedmont	7 50

Hamilton, Ont. Nov. 22, 1877.

Specially reported by H. BARNARD.

Retail Prices, Delivered per ton of 2,000 lb.

Scr. or Wilkes-B. Grate	$5 00	Lehigh Lump	$6 00
" " Egg	5 00	Brier Hill	5 50
" " Stove	5 25	Massillon	4 50
" " Nut	5 25	Smithing	5 50

Indianapolis, Ind. Nov. 21, 1877.

Specially reported by Messrs. COBB & BRANHAM.

WHOLESALE BITUMINOUS.

On board cars, per ton of 2,000 lb

White River	$2 65	Hocking Valley	$4 25
Brazil Block	2 60	Raymond City	4 60
Highland, grate	2 25	Youghiogheny	4 60
Indiana Cannel	4 60	Blossburg (smithing)	6 10
Peytona	5 75	Piedmont "	6 10

Per car, 12 tons.

Block coal, nut	$18 00	Block Slack	$17 00
Highland "	18 00		

RETAIL, BITUMINOUS.

Delivered per bushel of 70 lb.

White River	13c.	Block Nut, steam use	8c.
Brazil Block	13	" Slack, "	7
Highland Grate	11	Virginia Cannel	25
Block Nut, domestic use.	11	Youghiogheny	18
Highland Nut, " "	11	Blossburg	26
" " steam	8		

GAS COKE.

Per bushel, measure containing 2,888 cubic inches.

Retail, crushed	14c	Wholesale	9c
" Lump	12c		

ANTHRACITE.

Per ton of 2,000.

Wholesale on cars.		Retail delivered.	
Wilkes-Barre, all sizes	$5 75	Wilkes-Barre, all sizes	$7 00
Lackawanna, "	6 25	Lackawanna, "	7 00
Lehigh, "	6 75	Lehigh, "	7 50

Montreal. Nov 22, 1877.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per 2,240 lb.

Scotch Steam	$4 00	Cape Breton Steam	$3 25
Pictou	3 75	Newcastle Smith's	5 00

Anthracite at retail, per 2,000 lb. delivered.

Pittston, Pa. Nov. 19, 1877.

Pennsylvania Coal Company's Coal in yard, ton of 2000 lb.

Retail.

Lump, Egg and Stove	$2 25
Chestnut	2 00
Pea	1 00

Delivered, fifty cents per ton additional

Philadelphia. Nov. 22, 1877.

Specially Reported.

The receipts of coal are again increasing, many collieries, whose shipments were delayed by water being fairly under way. Vessels are in fair supply, and freights have a downward tendency, but would become firm again if owners were coming more freely. There is a fair local demand for small sizes. Large sizes are very dull. Bids were received to-day for 3,000 tons of steamer coal for the Government, and taken by the Reading Coal and Iron Company at $2.14@2.15, f. o. b. for Eastern points, and a small quantity for Norfolk, at $2.27. It is very little over one year since such prices were considered low at the mines, and the natural conclusion must be—that either a good deal of money was made then or a good deal must be lost now. Nothing but the most pressing necessity can drive producers to take contracts at such rates.

Richmond, Va. Nov. 22, 1877.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2,240 lb., f. o. b.

Kanawha Cannel	$9 00	New River Bituminous	$3 70
Coalburg Splint	5 70	Clover Hill Coal	3 00
Lewiston "	5 70	Norwood Gas & Steam Coal	7 70
Kanawha Gas Coal	4 90		

San Francisco, Cal.

From the *Commercial Herald* of Nov. 15, 1877.

COAL—Imports from January 1 to Oct. 30:

	Tons.		Tons.
Anthracite	18,173	Vancouver Island	84,094
Australian	61,246	Rocky Mountain	123
Coos Bay	25,504	Saghalien	40
Cumberland	10,129	Seattle	88,167
English	75,645	Bellingham Bay	8,600
Chili	8,145	Ione, Cal.	2,718
Mt. Diablo,	68,698	Carbondale, Cal.	177

Supplies continue excessive, rendering cargo sales almost an impossibility. We, however, note a sale, ex ship E. J. Harland, of 1,000 tons of Scotch upon private terms. On the 7th of June we noticed a new discovery of Coal deposits on the Pacific Coast by the arrival of schooner California from Ounalaska, Alaska Territory, with forty tons, which was sold to dealers at $8, and consumers at $10 per ton. A company has been incorporated under the name of Kimberly Coal Company, and in due course of time expects to receive some 500 tons for further tests. In this connection we note the arrival on the 8th inst. of the bark Adelaide Cooper from Unga Island with 150 tons. We have now to announce the following arrivals: City of Cashmere from Hull, 1,300 tons; War Hawk, 1,420 tons Nanaimo; Webfoot, 465 tons Seattle, etc. We quote Seattle and other coast Coals by the cargo at $6.50@7 for coarse; Australian, $7@7.25; all others entirely nominal. The Queenstown from Philadelphia is to hand with 232 hhds and 201 tons Eastern.

Sandusky, O. Nov. 19, 1877.

Specially reported by C. E. BLACK, Agt. Con. Coal & Mg. Co

We quote coal on cars at Sandusky, as follows:

Per ton of 2,000 lbs.

Anthracite.

	Grate.	Egg.	Stove.	Chestnut
Lehigh	$6 50	$6 50	$6 50	$6 50
Wilkes-Barre	5 75	5 75	5 75	5 75
Lackawanna	5 75	5 75	5 75	5 75

Bituminous.

Massillon	$3 00	Straitsville	$2 70
Del Carbo	2 75	Shawnee	2 70
Hocking Valley	2 70	Blossburg	4 75

Prices retailed delivered 50c.@75c. above car prices.

St. Louis, Mo. Nov. 21, 1877.

Reported by JAS. J. SYLVESTER, Secretary of the Anthracite Coal Association.

Retail prices, delivered. Ton of 2,000 lb.

ANTHRACITE.

	per ton.		per ton.
Lackawanna	$8 00@8 50	Schuykill	8 00@ 8 50
Wilkes-Barre	8 00@8 50	Lehigh	9 00@ 9 50

BITUMINOUS.

Blossburg	9 00	Big Muddy	3 00
Pittsburg	4 50	Illinois Coals	2 50@3 00
Indiana Block	4 00	Connellsville Coke.	6 50

Lake Freights on Coal.

Representing the latest actual charters to Nov. 21.

From Buffalo to Chicago	0.90
" " " Milwaukee	1.00
" " " Detroit	0.30
" " " Toledo	0.15
" " " Cleveland	0.25
" " " Racine, Wis	1.00
From Cleveland to Chicago	1.00
" " " Marquette, Mich	1.25
" " " Milwaukee	1.00
" Oswego, N.Y., to Chicago	1.50
" " to Toledo	0.60
" " to Toronto, Can	0.40
" Black River to Milwaukee	1.00
From Sandusky to Milwaukee	1.00

Freights on Bituminous Coals from the Mines to Tide Water Shipping Ports.

For the above rates we refer to our issue of Nov. 17.

For freights on *Lehigh and Wyoming Coal* we refer to our issue of Sept. 15.

For freights on *Schuylkill Coals* we refer to our issue of Nov. 17.

For rates of freight on the Chesapeake & Ohio Railroad we refer to our issue of Nov. 16.

Freights

Per ton of 2240 lb.

Representing the latest actual charters to Nov. 22, 1877.

PORTS.	From Philadelphia.	From Baltimore	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me.	....	....	....	2 25
Albany	....	....	....	....
Alexandria, Va	70	....	....	....
Brooklyn, N.Y.	75	....	....	....
Bangor, Me.	....	....	2 20	1 60
Bath, Me.	....	1 90	....	1 50
Baltimore	55@80	....	....	....
Boston, Mass.	165@183	1 90	2 00	1 50
Bridgeport, Ct.	....	1 50	1 70	70
Bristol, R. I.	....	....	1 75	90
Beverly, Mass.	....	....	....	1 50
Cambridge, Mass.	....	....	....	1 50
Chelsea, Mass.	....	....	....	....
Danversport, Mass.	1 75	....	....	....
East Cambridge, Mass	175@200	....	....	....
Fredericksburg, Va.	1 00	....	....	....
Fall River	1 30	1 50	1 75	90
Gloucester	....	....	....	....
Georgetown, D.C.	73	....	....	....
Hartford, Conn.	....	....	....	....
Hoboken	....	....	....	40
Hudson, N.Y.	....	....	....	....
Jersey City	....	....	1 50	40
Lynn, Mass	1 85	....	....	....
Medford, Mass.	....	....	....	....
Middletown	....	....	....	90
Milton Mass.	....	....	....	....
Nantucket, Mass.	....	....	....	90
New Bedford	125@135	1 60	1 85	90
Newburyport	170@175	2 15	....	1 75
New Haven	†92	1 50	1 70	70
New London	1 38	1 50	1 75	70
Newport	1 35	....	....	90
New York	75	1 40	1 60	40
Newark, N J.	....	....	....	....
Norfolk, Va.	65	....	....	....
Norwich	1 40	....		90
Pawtucket	....	....	1 85	1 00
Philadelphia.	....	....	....	....
Portland	1 70	1 90	2 00	1 50
Portsmouth, N. H.	....	2 15	2 25	1 65
Providence	130@135	1 50	1 75	90
Rockland, Mass.	....	....	....	....
Rockport	....	....	....	....
Richmond, Va.	75@80	....	....	....
Saco	....	....	....	1 75
Salem, Mass.	1 60	2 00	....	1 50
Saybrook, Mass.	....	....	....	....
Savannah, Ga.	....	....	....	....
Somerset, Mass.	....	....	1 75	90
Troy	97	....	....	....
Thomastown, Me.	....	....	....	....
Washington	70@75	....	....	....
Wilmington, N.C.	1 25	....	....	....
West Farms, N.Y.	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 8c per bridge extra.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Nov. 23, 1877.

American Pig.—We note sales of about 1,200 tons of No. 1 foundry, of various grades, at $18@$20, and 1,000 tons of gray pipe-iron on private terms. It is also rumored that about 2,000 tons of various brands of North River iron has been sold at prices under the market. This latter is probably the result of efforts to sell iron for shipment by river previous to the close of navigation. The market appears somewhat quiet at the close, most of the winter-bound consumers having made their purchases. We quote No. 1 foundry at $18@20; No. 2, $18@19, and forge $16@17.

Scotch Pig.—The sales of this class of iron are mostly in small lots for immediate consumption. We note sales of 100 tons Carnbroe, 200 tons Eglinton, and 100 tons of Coltness, all on private terms. We quote Glengarnock, $24.25; Coltness, $25.75@$26.50; and Eglinton, $24.

Rails.—We only learn of a sale of 5,000 tons of steel rails for Kansas del very. We quote steel rails at mills at $40@$43, and iron at $33@$37.

Old Rails.—Without business, we quote nominally at $18@18.50.

Wrought Scrap.—We note sales aggregating about 600 tons, at an average of about $22 here.

Baltimore, Md. Nov. 19, 1877

Specially reported by Messrs. R. C. HOFFMAN & Co.

The pig iron market continues dull with little inquiry and light sales. Prices ruling as follows:

Baltimore Charcoal	$29@30	Mottled and White	$15@16 00
Virginia Charcoal	28@30	Charcoal C.B. Blooms	50@55 00
Anthracite No. 1	19@20	" " Billetts.	55@60 00
" " 2	18@19	Refined Blooms	45@50 00
Anthracite No. 3	17@18		

Boston. Nov. 17, 1877.

Pig maintains the firm and steady attitude which it has now held for more than a month. There is little speculative feeling, and the demand runs mainly on

small lots for the iron foundries. We quote $21.50 for No. 1; $20@20.50 for No. 2, and $19.50@20 for gray forge.

Bar continues unchanged, quoting $43@45 for refined, and $35@36 for common. American rails, $35@$38. Nails are in light demand at unchanged prices. Sheet is selling at 3@3¼c. per pound. Russia is quiet at 10¾@11c. We quote, English spring steel at 7@8c. gold; 9@11c. for German; 9@11c. for machinery; 14c.@15c. for cast; 10@12c. for blister; 8c. for American spring; 13¼@14c. for cast, 9c. for blister, and 8c. for machinery.—*Commercial Bulletin.*

Buffalo. Nov. 22, 1877.

Specially reported by PALEN & BURNS.

We have no important sales to report; foundrymen, generally, here are buying only to supply their immediate wants, and preparing for the usual dullness which prevails here as elsewhere during the frosty season.

No. 1 Ex Foundry	$20 91
No. 2 "	19 91
Gray forge	18 91
American Scotch A 1 Foundry	24 25
Cherry Valley B 1 "	23 25
" " No. 2 "	22 25

Per gross ton 4 months delivery here.

Cleveland, O. Nov. 16, 1877.

Specially reported by Messrs. C. E. BINGHAM & Co.

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, L. S. Charcoal	$25 00	Am. S., No. 1, Ch Val.	$24 00
No. 2, " " "	25 00	" " B. 1, " "	23 00
No. 1, Anthracite	23 00	" " No. 2, " "	22 00
No. 2, "	21 00	No. 1, Massillon	24 00
No. 1, Bituminous	23 00	B—1, "	23 00
No. 2, "	21 00	No. 2, "	22 00

CAR WHEEL AND MALLEABLE IRON.

No. 3 L. S. Charcoal	26 00	No. 5 & 6, L. S. Charcoal	$27 00
No. 4, " " "	26 00		

BESSEMER IRON.

Nos. 1 & 2, L. S. Char.	$25 00

FORGE IRON.

No. 1, Gray	$20 00	White and Mottled	$19 00

Cincinnati, O. Nov. 20, 1877.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

There continues a good demand for all kinds of pig iron at previous prices, and we continue to quote as follows:

CHARCOAL.

Hanging Rock No. 1 Foundry and B 1	$23 00@23 50—4 mos
" No. 2 "	22 00@ ....—4 mos
" Soft Silver Gray	21 00@22 00—4 mos
" Mill	18 00@20 00—4 mos
Tennessee, No. 1 Foundry	22 00@ ....—4 mos
" " 2 "	21 00@ ....—4 mos
" Mill,	18 00@19 00—4 mos

STONE COAL.

Ohio, No. 1 Foundry	20 00@20 50—4 mos
" " 2 "	19 00@19 50—4 mos
" " 3 "	18 00@18 50—4 mos
" Mill	18 00@18 50—4 mos

COKE.

Ohio & W. Va. No. 1 Foundry	21 00@22 00—4 mos
" " " 2 "	20 00@21 00—4 mos
" " Mill.	18 00@19 00—4 mos

CAR-WHEEL.

Hanging Rock, C. B.	Hecla, Vesuvius, Jefferson, Etna.	40 00@ ....—4 mos
Maryland, "	Amherst & Cedar Pt.	37 00@ ....—4 mos
Missouri, "	Maramec	32 00@ ....—4 mos
Alabama, "	Woodstock	32 00@ ....—4 mos

BLOOMS.

Charcoal	45 00@50 00—cash.

SCRAP IRON.

Cast	40c.@ 45c.— "
Wrought	62½c.@ 1 00— "

Columbus, O. Nov. 20, 1877.

Specially reported by KING, GILBERT & WARNER, dealers in Pig Iron and Ores.

Business has been fairly active during the past week. There is no quotable change in prices. The usual time, four months, allowed on quotations:

FOUNDRY IRONS.

No. 1 Hanging Rock Charcoal	$24 to 25
No. 2 " " "	22 to 23
No. 1 Hocking Valley soft and strong from pure limestone ores	22 to 23
No. 2 Hocking Valley soft and strong from pure limestone ores	21 to 22
No. 3 Hocking Valley soft and strong from pure limestone ores	20 to 21
No. 1 American Scotch	21 to 22
No. 2 " "	19 to 20
Silver Gray	18 to 19

MILL IRONS.

Gray neutral	19 to 19 50
Mottled and white neutral	18 to 18 50
Gray cold short	18 to 18 50
Mottled and white cold short	17 to 17 50

Louisville, Ky. Nov. 20, 1877.

Specially reported by Messrs. GEORGE H. HULL & Co.

Market unchanged. A fair demand for all grades without change either way as to price. The usual time, four months, is allowed on the quotations below.

FOUNDRY IRONS.

No. 1 Hanging Rock, Charcoal	$23 00@24 00
No. 2 " " "	20 00@21 00
No. 1 Southern Charcoal	20 00@21 00
No. 2 " "	19 00@20 00
No. 1 Hanging Rock, Stonecoal and Coke	20 00@22 00
No. 2 " " " " "	19 00@20 00
No. 1 Southern Stonecoal and Coke	19 00@20 00
No. 2 " " " "	18 00@19 00
"American Scotch"	20 00@22 00
Silver Gray	18 00@19 00

MILL IRONS.

No. 1 Charcoal, Cold-short and Neutral	18 50@19 50
No. 1 Stonecoal and Coke, Cold-short and Neutral	18 00@18 50
No. 2 " " " "	17 50@18 00
No. 1 Missouri and Indiana Red-short	21 00@22 00
White and Mottled, Cold-short and Neutral	15 00@16 00

CAR-WHEEL AND MALLEABLE IRON.

Hanging Rock, and Cold Blast	34 00@38 00
Alabama and Georgia "	2[illegible] 00@33 00
Kentucky Cold-blast	25 00@33 00

Montreal. Nov. 23, 1877.

Pig iron per ton, Gartsherrie, $20.75 to $21.25; Summerlee, $20 to $20.50; Eglinton, $19.25 to $19.75; Hematite, $26 to $27; American $20; Langloan, $20.50 to $21. Bars, per 100 lb., Scotch and Staffordshire, $1.85 to $1.95; best do., $2.15 to $2.20; Swedes and Norway, $4.50 to $5.00; Lowmoor and Bowling, 5.50 to 6.00.—*Monetary Times.*

Pittsburgh, Pa. Nov. 20, 1877.

Specially reported by A. H. CHILDS.

	4 mos.		4 mos.
No. 1 F'dry	$21 00@22 00	Mottled & White	$16 50@18 00
" 2 "	20 00@21 00	Hot blast C'coal	21 00@25 00
Gray Forge	18 00@20 50	Cold " Western	38 00@40 00

Richmond, Va. Nov. 21, 1877.

Specially reported by ASA SNYDER, Esq.

There is still considerable inquiry for pig iron, both charcoal and anthracite, but the orders are for small quantities. Quotations are unchanged. Freights on pig iron to New York or Perth Amboy from Richmond $1.75 per ton.

Virginia Cold Blast Charcoal Pig Iron, cold short	$20 to $26
" " " " " " neutral	28 to 31
" Warm " " " "	20 to 25
" Anthracite 1 X	20 to 22
" " 2 X	19 to 21
" " 2	18 to 19
" " Coke West Va. 1 X	22 to 23
X2	21 to 22

San Francisco, Cal.

From the *Commercial Herald* of Nov. 15, 1877.

The market is sluggish for all sorts, and sales of invoice lots of Pig Iron. Tin-plate, etc., seem to be absolutely out of the question, even at a reduction from present low and nominal quotations. A closing-out sale of 100 pigs Sydney Tin is reported at a low figure. The ship David Crockett for New York carried Pig Lead, 100,040 lbs.

St. Louis, Mo. Nov. 20, 1877.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

COLD BLAST CHARCOAL—ALL NUMBERS.

Hanging Rock	25@38	Assorted Bar Iron $2. rates.	
Tennessee	26@30	No. 1 Wrought Scrap 80c. cwt.	
Kentucky	26@30	Heavy cast "	65 "
Missouri	26@30	Light " "	55 "
Georgia	26@30	Old rails	19 00 to 20 00
Alabama	26@30	Old car wheels	17 00 to 18 00

	No. 1.	No. 2.	Mill.	White and Mottl'd.
Missouri stone coal	$22 00	$21 00	$20 00	19 00
" charcoal	22 00	21 00	20 00	20 00
Tennessee charcoal	22 50	21 00	20 00	19 00
Tenn. coke very soft and strong	23 00	21 00	20 00	18 50
Hanging Rock charcoal	25 00	24 00	23 00	.....
" " cold short	24 00	23 00	.....	.....
	Ex No. 1	No. 1.	B No. 1.	No. 2.
Alice Hanging Rock coke	$25 00	$24 50	$24 00	$22 50
Quinnimount, W. Va., coke	23 50	23 00	22 00	21 00

METALS.

NEW YORK, FRIDAY EVENING, Nov. 23, 1877.

The Metal market has worn a more quiet appearance this week, although we have not yet entered upon that extreme quietness that past experience has taught us to anticipate at this season of the year.

Gold Coin.—During the week under review the price of gold has ranged from 102⅝ to 103¼, and closed at 102⅜.

Bullion.—Silver is to-day about the same as at the date of our last issue, having lost yesterday the fractional advance of the early part of the week, and remains quiet and nominal, without special feature, depending very much upon our Congressional legislation. The quotations are: in London, 54½d.; this city, 117½; and in San Francisco, 9 per cent. discount. Gold is quoted at ⅛@¼ per cent. premium.

Daily Range of Silver in London and New York per oz

Date.	London.	New York.	Date.	London.	New York.
	Pence	Cents		Pence	Cents
Nov. 17	54⅜	117½	Nov 21	54½	117¾
" 19	54½	117¾	" 22	54 5-16	117⅜
" 20	54½ 1-16	118	" 23	54¼	117⅛

Crown Point Bullion Product.—The total production of this company from 1865 to 1876, inclusive, was $29,353,635.98, of this amount $3,336,909.26 was produced from 1865 to 1868 inclusive, and was from the first or surface bonanza.

Estimate of the Pacific Coast Bullion Yield for 1877.—The San Francisco *Journal of Commerce*, of the 14th inst, estimates the precious metal yield for 1877, as follows: "At the present time it becomes a matter of much interest to arrive at some conclusion respecting the yield of the precious metals on the coast for the present year. The data for this is not very full, but sufficiently so. Storey county, according to the assessors returns, has yielded $26,560,200 for the first three-quarters of the year. Estimating the remaining quarter at proportionate figures, the yield of Storey county for 1877 would be $35,413,000 nearly. In the Eureka district the monthly yield of lead and silver is stated at one million dollars, or at the rate of $12,000,000 per annum, of which $10,000,000 is silver. The other districts of Nevada will yield at least $2,500,000, while tailings will yield $2,000,000. This makes a total of $50,000,000 for Nevada. California will yield $20,000,000. Colorado, by all accounts, will yield $10,000,000 this year, Utah will yield $6,000,000, Oregon and Washington $1,500,000, Arizona, $2,000,000, the Black Hills, $2,500,000, Idaho $1,500,000, Montana $2,500,000, and New Mexico $500,000. The total will then be as follows:

Nevada	$50,000,000
California	20,000,000
Colorado	10,000,000
Utah	6,000,000
Black Hills	2,500,000
Arizona	2,000,000
Idaho	1,500,000
Montana	2,500,000
New Mexico	500,000
Oregon and Washington	1,500,000
Total	$96,500,000

Adding the yield of British Columbia, $1,500,000, which always comes to this city, the grand total will not be less than $98,000,000. Of this Nevada will yield $33,000,000 in silver, California, $500,000, Colorado $6,000,000, Utah, $5,500,000, Arizona, $1,500,000, Idaho $250,000, Montana, $300,000, and New Mexico, $250,000, making a total of $47,300,000, and leaving a remainder of $50,700,000 gold."

Bullion Product of New Mexico.—The yield of precious metals in New Mexico, for the year ending June 30th, 1877, was, gold, $176,345; silver, $348,421. Total, $524,766. This is a falling off of $183,424 from the production of 1876. Grant and Colfax are the only counties in the Territory that produce these metals to any extent. Of the total production the Territory, outside of these counties, only produced $30,000.

Adoption of the Gold Standard by Finland.—Finland has adopted the gold standard. The Bank of Finland has on hand a surplus of silver amounting to from $1,500,000 to $1,750, 000, and is negotiating for its sale. Besides what it will thus sell, the bank intends to keep on hand a stock of $3,000,000 of silver.

Comparison of Our Western Mint Coinage with that of Foreign Countries.—The *San Francisco Bulletin* says: "There are few persons, probably, who realize the magnitude of the coinage operations at the San Francisco mint. It is by long odds the most important institution for coining in the country, or in the world. The coinage there last year exceeded in amount that of the three largest mints of the British Empire. These are the mints at London, England; Melborne, Victoria and Sidney, New South Wales. The total coinage in San Francisco during 1876 reached $42,704,500. The London mint coined during that period (estimated value in United States gold coin) $23,906,349, the Sidney mint $7,984,980, and the mint at Melbourne $10,322,640. The figures show quite as favorably when comparing the total coinage on the Pacific coast with the total by the mints of Australia. On this coast there are two mints—one at Carson, Nevada, and the other in this city. The total coinage of the Pacific coast establishments, from 1854 to June 30 of the present year, reaches the large amount of $493,614,725. Of this sum, the mint at Carson coined only $20,048,143. The total coinage of the Australian mints up to the last returns was $226,424,960, Five-sixths of this amount was coined at Sideny and one-sixth in Melbourne. Taking the coinage of the mints as indicating the yield of the precious metals, the figures show that about twice as much gold and silver are obtained from the mines on the Pacific coast as in all the Australian colonies.

BULLION SHIPMENTS.

We give below a statement showing the amount of the latest bullion shipments in addition to that announced in our issue of November 17:

Nov.	California	Nev.	....	$303,215 49
"	Consolidated Virginia	"	....	59,575 57
" 7	Northern Belle	"	....	11,138 00
" 4	Richmond	"	....	19,800 00
" 6	Standard	"	....	46,291 00
" 3	Tybo Con	"	....	12,403 00
" 9	Grand Prize	"	....	12,500 00
" 10	Leopard	"	....	(a)4,700 00
" 10	Alps	"	....	1,800 00
" 7	Raymond & Ely	"	....	14,280 00
" 3	Modoc Con	Cal.	....	12,403 00
Oct.	Leeds	Utah	....	37,500 00

(a) The bullion product of this mine for October was $16,735.44.

The Geddes & Bertrand mine, of Eureka, Nev., has yielded $930,000 since its discovery.

Tin.—The sales of tin to arrive are variously estimated at from 50 to 100 tons at 15⅞c.@16⅛c. On spot 300 to 400 pigs sold at 16¼c.@16⅜c. There is a belief among the trade that the supplies of tin will be temporarily light, and that as arrivals come in they will be promptly taken care of. The London cables

are conflicting. Straits is probably £69. We quote Straits at 16⅜ c.; L. & F., 16½; Refined, 16⅝ and Banca at 18 c.@18¼c.—prices all in gold.

Copper.—We only hear of spot sales of about 200,000 lbs. at 17¾ c. For futures, 18 c.@18⅛ c. is bid for delivery after January, according to time of delivery. The latest cable information quotes Chili Bars at £64 10 and Best Selected at £71 10s—a decline of 10 ,.

Tin Plates.—The West and South are reported to be doing a good business in these, while the direct business with the city is quiet. We quote, in gold, per ton, as follows: Charcoal tins, $6.12½@6.25, and e n $6; coke tins, $5.60, and ternes, $5.37½@5.50.

Lead.—We are reported sales of about 400 tons at 4.70c@4.87½c. At the close the market is very firm at 4⅞c. It is thought that the low price of refined lead and the correspondingly low price of white lead will greatly increase the consumption. There can be no doubt of this, and with the help of our export business with China and Japan, the price of lead is likely to assume more regularity, although it will probably be controled by the price that these markets may be willing to give for it, and not for any great length of time by combinations that may be formed in this country.

Spelter and Zinc.—There is not much doing in spelter. It is quoted at 5¾@6c, according to lots. Sheet zinc is very weak in this market, selling at 6¾c in a small way, while manufacturers are asking for large lots laid down here within a close fraction of as much.

Antimony.—This is one of the quietest articles on the list, and quoted at 13¼c for Cookson's, and 12¼c, gold, for Hallet's.

Quicksilver.—The San Francisco *Commercial Herald* of November 15 says: A telegram from Hongkong announces a second shipment of 1,000 flasks to this city—probably per City of Peking. Per steamer Ajax on the 7th inst. we received fifty flasks from Portland, Oregon. This is the first production of the Emeline Mine, of Yreka, California, being prospected for over a year, and just commenced producing this fall. The expense of shipping by way of Portland is about the same as through California. Our market at present is very sluggish; the general asking price is 45c, but purchases for export have been made to a moderate extent at 44c. The Georgia takes 220 flasks to Manzanillo, valued at $7,500. Receipts for the week, 913 flasks.

Salt Lake Ore and Metal Market.

SALT LAKE CITY, UTAH, November 23, 1877.

Argentiferous Lead (Base Bullion).—$40@42 per ton for lead; $1.17@$1.18 per ounce for silver; $20 per ounce for gold. The quotations for silver are based upon the silver contents in the lead of 80 to 120 ounces per ton of 2,000 lb.

Statement of Ore and Bullion shipped from Salt Lake during week ending Saturday, Nov. 10, 1877.

BULLION.

Consignor.	Consignee.	lb.	
Smelting Works			
Waterman...	Omaha.....	103,253	....
Pascoe.....	"	20,556	....
Germania....	"	61,459	....
Durell.....	"	63,876	....
Queen.....	"	a129,795	....
Frisco.....	"	b61,086	440,025
Mingo.....	Pittsburg...	149,274	....
Telegraph....	"	125,283	....
Pascoe.....	"	41,058	....
Williams.....	"	c21,933	337,548
Morgan.....	Crooks Bro's	d21,973	21,973
Morgan.....	St. Louis...	65,820	....
Highland....	"	21,564	....
Frisco.....	"	102,019	....
Waterman...	"	42,568	231,971
			1,031,517

ORES.

Conklin Sample Works..	Omaha.....	e20,000	....
Raymond & Ely Mine...	"	f83,950	....
Wild Dutchman Mine..	"	65,150	....
Griffin Mine..	"	22,000	191,100
Flagst'ff Mine	Hilliard....	187,410	187,410
			378,510

a b c Bullion from the San Francisco District, Southern Utah.
d Meadow Valley Co., Nev.
e Small lots of ore from different mines.
f Tailings, concentrations, etc.

Mr. J. B. Meader, under date of the 10th inst., gives the following statement of shipments for the first ten months of the year:

Shipments of base bullion for October.	3,843,744 lb.
Shipments of base bullion for 9 months	36,190,255 lb.
Total for 10 months.....	40,033,999 lb.
Ore shipments for October reduced to lead.....	247,963
Ore shipments for 9 months...	5,649,264— 5,879,226 lb.
Total shipments of lead for 10 mos.	45,931,225 lb.

The *Inter-Ocean's* correspondent, under date of the 12th inst., says: The Carbonate mine has attached the ore that was got out of the Jailor Jack mine under a lease, and is holding it under a bond to await proceedings at law. This Carbonate mine is a new and important mineral discovery, on Kesler's Peak, and the owners bought the Jailor Jack which was an old discovery. At the time of this purchase the Jailor Jack was under a lease. This expired last Sunday night, when the lessees turned the mine over to the Carbonate, supposing the ore taken out belonged to them. The ore in dispute is worth about $20,000.

FINANCIAL.

New York Stocks.

NEW YORK, Friday Evening, November 23, 1877.

There has been a very fair business in Delaware, Lackawanna & Western, at $47¾@$50¾, closing at $50¼. Yesterday and Thursday this stock was weak, but has secured much strength to-day. The sales for the week have amounted to 174,020 shares. Delaware & Hudson Canal has been but very sparingly dealt in, prices following those of the Delaware, Lackawanna & Western. New Jersey Central has shown more strength during the week, advancing to 15, then falling off to 14, and recovering to 14¼ at the close. It is difficult to say just what has given strength to the coal stocks to-day, unless it is the vast amount of talk of a new combination. From all the discussions we have heard on the subject, it is proposed that the two companies represented in the speculations of this market shall reduce their proportion of the business to meet the increase demanded by two or three of the other companies. In this case ruin must come to these companies, although it may not come so rapidiy as under the competition that has been in progress during the past year.

Delaware, Lackawanna & Western Railroad.—In answer to a committee of the Patterson (N. J.) Board of Trade, President Sloan says that this company will soon build the long-promised spur from the Boonton Branch into the city of Patterson. The road now passes around the outside of the city and remote from the business centre, and is difficult of access as well. The proposed spur will be about 1½ miles long.

Baltimore & Ohio Railroad.—From the annual report of this company we take the following, showing its coal traffic for the year: The coal trade of the main stem shows an aggregate of 1,440,265 tons, which includes 370,839 tons for the company's supply. Of this quantity that transported for the public, delivered in Baltimore, is 995,132 tons, and delivered at local points upon the line, 74,294 tons. The continued depression in manufacturing and steamship interests has again injuriously affected the coal trade. In order to meet competition, and maintain this important traffic as far as practicable, the tariff was again reduced, on the fourteenth day of June, 1877, twenty-five cents per ton. Notwithstanding, it will be seen that there was a further decrease of tonnage. Proper agreements as to rates with competing lines, and a revival of the general industries of the country, will doubtless favorably affect this trade. During the fiscal year of 1877, 1,138,103 tons of coke and coal were transported on the Pittsburg Division, and 293,403 tons of coal on the Trans-Ohio divisions. The aggregate of coal and coke thus transported, including all divisions, was 2,871,771 tons.

Columbus & Hocking Valley Railroad.—The Monday Creek branch of this road is now completed from the junction with the main line near Nelsonville, O., up Monday Creek to the mouth of Snow Fork, three miles. Work is progressing on the rest of the branch, which there turns northward and follows up the creek to New Straitsville, where it will meet the Straitsville branch of the same road. The Snow Fork branch leaves the Monday Creek branch at the mouth of Snow Fork, and is nearly completed for three miles up that stream, to the Ogden Furnace; it will be hereafter extended three miles further, to the Croff Furnace. There is great activity in the region, and several new furnaces are being built.

Miscellaneous Sales and Quotations.

Sales and quotations of the stocks and bonds dealt in here at Philadelphia, and Baltimore for the week ending the 23rd inst. are given in the following tables. The Philadelphia quotations will have a * affixed. The Baltimore quotations are indicated thus †.

STOCKS.

	Quotations. High-est.	Low-est.	Clos-ing.	Sales Shares
American Coal Co.....	—	—	35	—
*Cambria Iron Co.....	—	—	50	—
*Pennsylvania Salt Manf'g Co.	—	—	64	—
*Westmoreland Coal Co.....	—	—	62	—
*Buck Mountain Coal Co.....	—	—	25	—
*Schuylkill Nav. Co	—	—	—	—
St. Louis, I. M. & S. RR. Co...	7	6¾	6¾	300
Spring Mountain Coal Co.....	—	—	—	—
†Balt. & Ohio RR. Co. pref...	—	—	—	—
" " " common	—	—	10¾	—
†Pittsburg & Connellsville RR.	—	—	—	—
†George's Creek Coal Co.....	—	—	99	—
†Santa Clara Mining Co.....	—	—	8¼	—
†Atlantic Coal Co.....	—	—	1.25	—

BONDS.

D. L. & W. 7s, Convt., 1892	J. & D.	—	—	—	—	
" " 2d mtge., 1881	M. & S.	106	105⅛	105⅜	$4,000	
N. J. C., 1st mtge., new...	F. & A.	112	111½	111½	13,000	
" " 1st mt., cons. 1899	Q.	68	66¾	67	10,000	
" " Convt	M. & N.	63	61¾	62⅛	42,000	
L. & W. B. Coal Co., cons.	Q.	31¾	27¾	31½	29,000	
Am. Dock & Imp. 7s.....	J. & J.	—	—	41	—	
D. & H. C. Co., 1st m., 1884	J. & J.	—	—	99½	—	
" " " " " 1891	J. & J.	—	—	100	—	
" " " " " 1877	J. & J.	—	—	—	—	
" " " reg., 1894	A. & O.	96½	—	95	2,000	
" " " coup., 1894	A. & O.	—	—	—	—	
St. L. I. M. & S., 1st mt. 1892	F. & A.	102½	102	102⅝	32,000	
Ches. & Ohio, 1st mt., 1899	—	27	—	27	500	
*L. V. RR., con. m. 6s, 1923	J. & D.	98¼	—	—	2,000	
" " 2d m., 7s, 1910	M. & S.	113¼	—	113	3,000	
" " reg., 1898	J. & D.	110½	—	110	2,000	
" " coup., 1898	J. & D.	110	109	109½	8,000	
*P. RR., 1st mtge., 1880	J. & J.	106½	—	106½	1,500	
" Gen. mtge. reg., 1910	A. & O.	—	—	106¾	—	
" Con. m. 6s. cou.. 1905	J. & D.	—	—	—	—	
" " " reg. 1905	Q.	—	—	—	—	
" gen. M. Coup., 191c	J. & J.	107	—	—	4,000	
" New Loan 5s	—	108¼	108⅛	—	21,300	
*P. & R. RR., 7s, 1893	A. & O.	112	—	—	8,000	
" " con. m. 7s. con. 1911	J. & D.	102	—	102	18,000	
" " Deb. 6s, 1893	J. & J.	—	—	—	—	
" " New convt. 7s. 1893	J. & J.	57	—	—	1,000	
" " Con. mtge. 7s. reg.	J. & D.	102½	—	—	5,000	
" " 6s, 44-80 1880	J. & J.	—	—	105	—	
*P. & R. C. & I. Co. Deb. 7s	M. & S.	—	—	—	—	
*P. & R. C. & I. Co.....	—	*62½	—	—	1,000	
*L. C. & N. Co. 6s. 1884	M. & Q.	—	—	102¾	—	
" " RR. loan 1897	F. & Q.	101	100	—	600	
" " Con. mtge. 7s.	J. & D.	—	—	—	—	
" " Cvt. gold, 1894	M. & S.	—	—	—	—	
" " Gold Loan, 1807	J. & D.	87½	—	88¼	2,000	
Schuylkill Nav., 6s. 1897	M. & Q.	—	—	—	—	
Pa. and N. Y. Canal, 7s.	J. & D.	—	—	113	—	
Pa. Canal Co.....	J. & J.	—	—	63	—	
Susquehanna Coal Co. 6s.	—	—	—	—	—	
†Ches. & Ohio 1st m. 6s.	M. & N.	—	—	—	—	
†Balt. & Ohio 6s. 1880....	J. & J.	—	—	104	—	
† " " 6s. 1885.....	A. & O.	—	—	103¾	—	
Total transactions for the week.....					$2'5.9 o	

* Helfenstein Tract.

Philadelphia Stocks.

PHILADELPHIA, Friday Evening, Nov. 23, 1877.

In Pennsylvania Railroad the transactions have amounted to 68,385 shares, at 30⅞@32⅜, closing at 32⅛. Lehigh Coal & Navigation has been steadily strengthening, with sales of 4,012 shares at 16⅝@18, closing at 17¾. Lehigh Valley has been dealt in to but a very small extent, at 39@41, closing at 40. The dealings in Philadelphia & Reading Railroad have been more liberal, reaching 14,038 shares, at 15@16¼, closing at 16⅛. The advance in the strictly coal shares is attributable to combination talk, while that in Pennsylvania Railroad is largely the result of manipulation by the New York "bull" party.

Dalzell Petroleum Co.—The annual meeting of this company will be held on the 11th of December.

Pennsylvania Railroad.—Arrangements are being made to lay a second track on the Philadelphia and Erie Division between Sunbury and Williamsport, about 40 miles.

The city council of Cumberland, Md., has passed a resolution submitting to the people the question of granting a subsidy of $65,000 in aid of the extension of the Bedford Division from State line to Cumberland. The company organized to build this extension is called the Pennsylvania Railroad Company in Maryland. It is said that this company is surveying a route from Wilkes-Barre to Northumberland, Pa., in order to extend their coal trade. They now run over the L. & B. track between Nanticoke and Northumberland.

Lehigh Valley Iron Company of Coplay, Pa.—75 shares of the capital stock of this company sold at auction recently at $10 per share.

The following bonds were sold at auction during the week:

Huntington & Broad Top Railroad Company.—$5,000 of the second mortgage 7 per cent. bonds at 101¾ per cent.

Schuylkill Navigation Company. $5,000 of the 6 per cent. bonds of 1895, J. & J., at 51¾ per cent.

Susquehanna Canal Company.—$500 of the 6 per cent bonds, J. & J., at 46 per cent.

Copper Stocks.

Reported by Wilson W. Fay & Co., Room 7, Traveler Building, 31 State Street, Brokers in Mining and Miscellaneous Stocks.

BOSTON, WEDNESDAY EVENING, Nov. 21, 1877.

There is as yet no apparent change in the state of the market, and nothing in view at present which would indicate an immediate change. We see from the report of the market on copper that very likely will be no important demand for it before the middle of January, and as the prices of the stocks are very largely affected by the price of copper, it looks as if there would be no rise in the market until then. But, nevertheless, some few of the more principal stocks may be manipulated, and made to rise before that time, but the long looked for "general rise" will, probably, not take place until there is some favorable change in the prices of copper.

Calumet & Hecla is looking stronger, having advanced to 175 bid, and 177 asked.

On Copper Falls there is no change, and nothing of interest transpiring.

Central is quiet and a little weaker, being offered at 37.

The committee appointed to make arrangements for an assessment on National have not reported as yet, and the stockholders are still in doubt whether to sell

COAL TRANSPORTATION AND GENERAL MINING STOCKS.

Name and Location of Company.		Feet on Vein.	Capital Stock	Shares. No.	Shares. Par Val.	Assessments. Total levied to date.	Assessments. Date and amount per share of last. Mo.	Yr.	Amt.	Dividends. Total paid to date.	Last Dividend. Mo.	Yr.	Amt.	Rate per Ann.	Highest and Lowest Quotations per Share in Currency. Nov. 17. H.	L.	Nov. 19. H.	L.	Nov. 20. H.	L.	Nov. 21. H.	L.	Nov. 22. H.	L.	Nov. 23. H.	L.	Sales.
Coal Stocks.			$			$				$				Per cent.													
Consol. Coal	Md.	....	10,250,000	102,500	$100	*				...	Jan.	1877	2½	10	..	..	25	..	..	..	..	..	..	..	..	..	15
Del. & H. Canal	Pa.	....	20,000,000	200,000	100	*				38,821,104	Aug.	1876	4	9	45¼	44¼	47	45	47½	46⅜	46⅜	44¼	45⅛	45	47½	45½	9,463
Del., Lac. & W. RR.	Pa.	...	26,200,000	524,000	50	*				....	July	1876	2½	5	50	47¾	50¾	48⅞	..	..	50¾	48⅝	49⅞	48¾	50¾	49½	174,020
Lehigh C. & Nav	Pa.	....	10,448,550	208,971	50	*				....	Nov.	1876	1⅜	3½	17¼	16⅝	17⅛	17¼	17½	17¼	17⅛	17½	..	.	18	17⅜	4,012
Lehigh Valley RR.	Pa.	....	27,042,900	540,858	50	*				....	Oct.	1877	1	5	39	39	39¾	39	39½	39⅛	40	39¾	40	40	41	40	809
Maryland Coal	Md.	....	4,600,000	44,000	100	*				...	Jan..	1876	1½	3½	..	..	..	..	..	..	..	..	10	..	..	..	20
N. J. Central RR.	Pa.	....	20,600,000	206,000	100	*				....	Apr.	1876	2½	12	13	13	13⅝	13⅜	14	13½	15	14	14	14	14¼	14	1,343
Penna. Coal	Pa.	....	5,000,000	100,000	50	*				....	Aug.	1877	3	12	..	..	..	..	..	..	..	..	..	..	..	..	....
Pennsylvania RR.	Pa.	....	68,868,200	1,377,404	50	*				....	Nov.	1877	1½	8	31⅝	30⅞	31⅝	31⅜	31⅝	31⅜	31⅞	31⅝	32⅜	31⅝	32⅜	32¼	68,385
Phil. & Read. RR.	Pa.	....	34,278,175	685,563	50	*	....	....	.....	43,012,497	Jan..	1876	*2½	10	15⅜	15	15⅞	15⅜	16	15⅝	15¾	15½	15⅞	15⅝	16¼	16½	14,032
General Mining Stocks																											
Alpha Cons. g. s.	Nev.	300	3,000,000	30,00	100	210,000	Aug.	1877	$1 00	....	.. ..	....	.....	..	..	..	..	..	12¼	..	4½	..	13	..	12½	12¾	400
American	Colo.	....	1,000,000	100,000	10	*	....	....	....	....	....	....	.....	..	4¼	..	4⅛	4¼	4¼	..	4½	..	4½	..	4½	4⅜	4 000
Am. Flag, g	Colo.	5.300	600,000	50,000	10	*	....	....	....	....	....	....	.....	..	12c	11c	11c	..	..	..	11c	10c	..	..	10c	..	8,300
Belcher, g. s.	Nev.	1,040	10,400,000	104,000	100	1,072,400	Sept	1877	1 00	15,397,200	Apr.	1876	$1 00	12	..	..	..	..	5¼	..	..	..	5¼	..	6	..	300
Bertha & Edith g	Vir.	645 acs.	3,500,000	350,000	10	*	....	....	....	....	....	....	.....	..	12c	9c	11c	7c	6c	..	8c	7c	7c	6c	8c	7c	35,000
Best and Belcher, g. s.	Nev.	545	10,080,000	100,800	100	337,792	Aug.	1877	1 00	....	....	....	.....	..	..	..	..	..	..	..	..	..	9½	..	..	..	100
Bobtail, g	Colo.	2,500	1 136,630	227,326	5	*	....	....	....	....	....	....	.....	..	..	..	..	..	..	..	2¾	..	..	..	..	..	100
Bobtail Tunnel, g	Colo.	....	100,000	20,000	5	6,000	July	1873	0 30	20,000	Dec..	1876	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Bullion, g. s.	Nev.	943½	10,000,000	100,000	100	2,702,000	Oct.	1877	1 50	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Caledonia, g. s.	Nev.	2,188	10,000,000	100,000	100	1,435,000	Oct.	1877	75	....	....	....	.....	..	..	..	4	..	4¼	..	..	..	..	..	..	..	200
California, g. s.	Nev.	600	54,000,000	540,000	100	....	....	....	.....	20.520.000	Nov.	1877	2 00	24	..	..	..	..	..	..	..	..	..	..	..	..	....
Chollar Potosi, g. s.	Nev.	1,400	2,800,000	28,000	100	1,506,000	Oct.	1877	3 00	3,080,000	Feb..	1872	1 00	12	..	..	..	..	..	..	..	..	36	..	..	..	100
Cleveland, g	Colo.	3.715	250,000	25,000	10	*	....	....	....	....	....	....	.....	..	..	..	7½	7⅜	..	..	..	..	..	..	..	..	200
Cons. Hercules & Roe.	Colo.	16,500	1,000,000	100,000	10	*	....	....	....	120,000	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Cons. Imperial, g. s.	Nev.	468	50,000,000	500,000	100	575,000	Oct.	1877	0 20	....	....	....	.....	..	..	..	..	..	..	..	..	..	1¾	..	..	..	100
Con. N. Slope & E. C. T.	Colo.	15,000	500,000	10,000	50	*	....	....	....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Cons. Virginia, g. s.	Nev.	710	54,000,000	540,000	100	474,600	June	1873	3 00	34,560,000	Nov.	1877	2 00	24	..	..	..	..	..	..	..	..	..	..	..	..	....
Confidence, g. s.	Nev.	130	2,496,000	24,960	100	243,840	Mar.	1873	1 00	78,000	May.	1865	8 ½	8½	..	..	..	..	..	6	..	6¼	..	6	..	5½	..	500
Crown Point, g, s.	Nev.	600	10,000,000	100,000	100	1,573,370	Sept.	1877	1 00	11,588,000	Jan..	1875	2 00	24	..	..	..	..	..	6½	..	..	..	..	6	..	300
Douglas	Colo.	21,000	1,000,000	10,000	100	*	....	....	....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Eureka Cons. g. s. L.	Nev.	..	5,000,000	50,000	100	100,000	May	1876	1 00	1,300,000	Oct.	1877	3 00	24	..	..	..	..	6½	46	..	..	..	..	..	..	200
Eureka G. Mg. g	Cal'f	1,680	2,000,000	20,000	100	....	....	....	.....	2,134,000	Aug.	1877	2 00	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Exchequer, g. s.	Nev.	400	10,000,000	100,000	100	280,000	Sept.	1876	1 00	....	....	....	.....	..	..	..	..	..	4½	..	..	4½	..	4¾	..	4½	..	400
Gould and Curry, g. s.	Nev.	612	10,800,000	108,000	100	2,450,000	Aug.	1877	1 00	3,826,800	Oct..	1870	10 00	..	..	..	9	..	9	..	..	..	..	9¾	..	9½	..	500
Granville Gold	N. C.	9,000	1,000,000	100,000	10	*	....	....	0 50	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Hale & Norcross, g. s.	Nev.	400	11,200,000	112,000	100	2,634,000	Oct.	1877	1 00	1,598,000	Apr.	1871	5 00	12	..	..	..	..	8⅛	..	..	..	8	..	8¼	..	300
Henry Tunnel	Nev.	3,000	2,000,000	80,000	25	*	....	....	....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Hukill, g. s.	Colo.	3,288	1,000,000	100,000	10	....	....	....	.....	10,000	Nov.	1877	0 10	12	4¾	..	..	..	4⅞	4¾	..	..	4¾	4½	..	..	600
Julia Cons., g. s.	Nev.	3,000	11,000,000	110,000	100	440,000	Aug.	1877	1 00	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	2	..	100
Justice, g. s.	Nev.	2,100	10,500,000	105,000	100	2,027,500	Oct.	1877	2 00	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Kentuck, g. s.	Nev.	95	3,000,000	30,000	100	270,000	Dec..	1874	1 00	1,252,000	Mar.	1870	5 00	..	..	..	..	..	..	..	5	..	5	..	5	..	500
Kossuth, g. s.	Nev.	2,700	5,400,000	108,000	50	421,200	Aug.	1877	0 15	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Lacrosse	Colo.	3.900	1,000,000	100,000	10	*	....	....	....	....	....	....	.....	..	28c	25c	27c	26c	24c	19c	23c	20c	22c	20c	22c	21c	17,700
Leopard, L. g. s.	Nev.	1,500	5,000,000	50,000	100	100,000	July.	1877	50	162,500	Dec..	1876	0 50	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Lucerne Mining	Colo.	4,200	5,000,000	500,000	10	*	....	....	....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Mariposa, preferred	Cal.	44.387	5,000,000	50,000	100	1,425,000	June	1877	1 00	....	....	....	.....	..	..	..	1⅞	..	2	..	..	..	..	..	..	..	1,500
" common	"	acres.	10,000,000	100,000	100	1,425,000	June	1877	1 00	....	....	....	.....	..	..	..	1½	..	..	..	1¾	..	..	..	..	..	600
Memphis	Colo.	6,000	300,000	60,000	5	*	....	....	....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Merrimac, s.	Mass.	1,500	500,000	50,000	10	*	....	....	....	90,000	Nov.	1877	10c	12	5¼	5	5¼	..	5¼	..	..	..	..	..	..	..	800
Mexican, g. s.	Nev.	600	10,080,000	100,800	100	181.440	Aug.	1877	0 30	....	....	....	.....	..	..	..	9	..	15½	..	14	..	..	..	14¼	..	400
Moose	Colo.	39,000	2,000,000	200,000	10	*	....	....	....	100,000	Nov.	1877	0 25	3	7½	7	7¼	7⅛	7¾	7⅛	7¼	7	7⅛	7	7⅞	7⅛	13,750
N. Y. & Colo., g	Colo.	....	1,000,000	50 000	20	*	....	....	....	20.000	Mar.	1877	0 20	..	2¾	2¼	2⅞	2⅜	2⅜	2⅜	2⅜	2¼	2⅞	2¼	2⅛	2⅜	6,100
Northern Belle, s.	Nev.	1,600	5,000,000	50,000	100	...	....	....	....	1,400,000	Oct.	1877	1 00	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Ontario.	Utah	3,000	10,000,000	100,000	100	....	....	....	.....	700,000	Nov.	1877	1 50	6	23⅛	..	23¼	..	23¼	23½	23¼	..	..	..	23¾	23⅜	2,155
Ophir, g. s.	Nev.	675	10,080,000	100,800	100	2,934,400	May.	1875	2 00	1,394,400	Mar.	1864	4 00	..	..	..	..	..	..	..	..	..	..	..	41	..	100
Original Comstock, g. s.	Nev.	....	10,000,000	10,000	100	....	....	....	.....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Overman, g. s.	Nev.	1,200	3,840,000	38,400	100	2,567,880	Nov.	1877	3 00	....	....	....	.....	..	..	..	21¼	..	23¼	..	..	..	23½	..	21¾	..	400
Pleasant View, g	Colo	1,200	200,000	20,000	10	*	....	....	....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Quicksil. preferred	Cal.	8,500	4,291,300			*	....	....	....	....	....	....	.....	..	33½	..	33	32¾	33	..	..	..	34	..	..	..	650
" common	"	acres.	5,708,700	100,000	100	....	....	....	.....	....	....	....	.....	..	17	..	..	..	..	..	..	..	..	..	17½	..	495
Raymond and Ely, g. s.	Nev.	5,000	3,000,000	30,000	100	540,000	Dec.	1876	1 00	3,075,000	Sept.	1873	3 00	..	..	..	..	..	..	..	..	..	..	..	..	..	....
St. Joseph, L.	Mo.	2600 acs.	1,000,000	100,000	10	....	....	....	.....	250,000	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Santiago, g. s.	Nev.	2,000	11,200,000	112,000	100	*	....	....	....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Savage, g. s.	Nev.	800	11,200,000	112,000	100	3,418,500	Sept.	1877	1 00	4,460,000	June	1869	3 00	..	9	..	9¼	..	9¼	9	9¼	..	9¼	..	9¼	..	1,000
Seaton, g. s.	Colo.	1,700	500,000	50,000	10	*	....	....	....	10,000	May.	1877	0 10	12	..	..	1½	..	1⅞	..	..	..	..	..	..	..	300
Seg. Belcher. g. s	Nev.	160	640,000	6,400	100	244,800	Apr.	1876	5 00	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Sierra Nevada. g. s.	Nev.	3,650	10,000,000	100,000	100	1,800,000	Oct.	1877	0 50	102,500	Jan..	1871	1 00	10	..	..	..	..	..	..	..	..	..	..	..	..	....
Silver City, g s.	Nev.	3,900	6,310,000	63,100	100	15,775	Nov.	1876	0 25	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Silver Hill, g. s.	Nev.	5400	5,400,000	54,000	100	972,000	July.	1877	1 00	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
South Comstock, g. s.	Nev.	1,500	10,000,000	100,000	100	54,000	Jan.	1877	0 25	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
South. California, g. s.	Nev.	1,500	5,000,000	50,000	100	12,500	Feb.	1877	0 25	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Southern Star. g. s.	Nev.	1,500	6,000,000	600,000	100	....	....	....	.....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Trenton, g. s.	Nev.	..	10,000,000	100,000	100	...	....	....	....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Union Cons., g. s.	Nev.	850	10,000,000	100,000	100	285,000	Oct.	1877	25	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
West Belcher, g. s.	Nev.	1,000	10,000,000	100,000	100	....	....	....	.....	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Yellow Jacket, g. s.	Nev.	1,200	12,000,000	120,000	100	3,198,000	Sept.	1877	2 00	2,184,000	Aug.	1871	2 50	..	..	..	..	..	..	..	12	..	13	..	12¼	..	200
Young America, g. s.	Nev.	1,000	3,000,000	30,000	100	64,500	Oct..	1877	0 20	....	....	....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Copper Stocks.																											
Allouez, c	Mich.	..	1,000,000	20,000	50	940,000	May.	1876	5 00	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Calumet & Hecla, c.	Mich.	..	2,000,000	80,000	25	1,200,000	....	....	.....	11,850,000	Aug.	1877	5 00	20	....	....	....	....	....	....	....	....	....	....	....	....	....
Central, c	Mich.	..	500,000	20,000	25	100,000	June	1862	0 65	1,160,000	Feb.	1877	7 00	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Copper Falls, c	Mich.	..	1,000,000	20,000	50	535,000	May.	1876	.....	100,000	Nov.	1871	1 00	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Dana, c	Mich.	..	500,000	20,000	25	68,000	Jan..	1863	0 50	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Dawson, s	Ont..	..	1,200,000	60,000	20	....	....	....	.....	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Duncan, s	Ont..	..	1,200,000	60,000	20	75,000	July.	1876	4 25	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Franklin, c	Mich.	..	500,000	20,000	25	360,000	June	1876	5 00	585,000	Nov.	1871	1 00	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Humboldt, c	Mich.	..	500,000	20,000	25	100,000	Sept.	1876	0 15	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
International, s	Ont..	..	1,200,000	60,000	20	....	....	....	.....	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Madison, c	Mich.	..	500,000	20,000	25	123,000	Sept.	1876	0 10	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Mesnard, c	Mich.	..	500,000	20,000	25	160,000	Apr.	1876	0 50	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Minesota, c	Mich.	..	1,000,000	20,000	50	436,000	June	1869	1 00	1,820,000	Mar.	1876	0 50	..	....	....	....	....	....	....	....	....	....	....	....	....	....
National, c	Mich.	..	500,000	20,000	25	195,000	Oct..	1875	1 00	360,000	Oct..	1873	1 00	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Osceola, c	Mich.	..	1,000,000	40,000	25	880,000	May.	1876	2 00	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Petherick, c	Mich.	..	500,000	20,000	25	165,533	Mar.	1876	0 50	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Pewabic, c	Mich.	..	500,000	20,000	25	185,000	June	1868	3 00	460 000	July	1873	1 00	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Phœnix, c	Mich.	..	1,000,000	20,000	50	817,500	Sept.	1870	3 00	20,000	Jan.	1876	1 00	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Quincy, c	Mich.	..	200,000	20,000	10	....	....	....	.....	2,130,000	Feb.	1877	4 00	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Ridge, c	Mich.	..	500,000	20,000	25	200,000	....	....	.....	90,000	Feb.	1875	1 00	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Rockland, c	Mich.	..	500,000	20,000	25	495,000	Jan..	1874	1 00	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Star, c	Mich.	..	500,000	20,000	25	265,000	Mar.	1876	0 50	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Superior, c	Mich.	..	500,000	20,000	25	340,000	Mar.	1874	0 2 5	....	....	....	.....	..	....	....	....	....	....	....	....	....	....	....	....	....	....

g. Gold. s. Silver. L. Lead. c. Copper. * Non-Assessable.

Total Assessments levied to date.....$46,062,530 | Total Sales of coal stocks for the week..... 272,105 shares.
Total Mining Dividends disbursed to date.....209.391,001 | Total Sales of Mining Shares for the week..... 98,160 do

* A dividend of 3½ per cent. was declared on the preferred stock of this Co. in July, 1877.

their stock or buy more. It closes 10c bid and 15c asked.

Quincy fell off during the week and sold at 36, but is stronger this evening at 37@38.

Ridge is quiet, and rather firm, at 1¾@1⅞, having had a slight decline.

Duncan Silver has fallen to ¾, and sold at that figure, the sellers being frightened out of their stock by the prospects of an assessment.

The following notice has been issued by the Secretary of the company:

"The annual meeting of the stockholders of the Duncan Silver Mining Company will be held at the office of the company, No. 79 Water street, on Monday, the 3d day of December, 1877, at 3 o'clock P. M., for the choice of directors for the ensuing year, and for any other business that may legally come before the meeting."

The stock closes 11-16@⅞, and looks a little better this evening.

International is quiet, and has fallen off a little, closing 20@25c.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Nov. 23, 1877.

Out of a total of little over 98,000 shares American Flag has figured to the extent of 8,300 shares at 12c.@ 10c., Bertha & Edith 35,000 shares at 12c.@6c., Lacrosse 17,700 at 28c.@19c., making a total of 63,000 shares or more than two-thirds of the whole business, while representing a value not so great as 100 shares of New York Central Railroad stock. Of the remainder of the list nearly one-half of the business was in Moose, in which the transactions foot up 13,750 shares at 7@7½.

MINING STOCK QUOTATIONS IN SAN FRANCISCO.

We give below a table showing the closing price of mining shares in San Francisco yesterday, 22d inst.

Alpha	12	Mexican	14
Belcher	6	Northern Belle	14
Best & Belcher	19	Ophir	36
Bullion	6½	Original Comstock	..
Caledonia	4	Overman	21
California	27	Raymond & Ely	8
Chollar Potosi	34	Santiago	..
Con. Imperial	1	Savage	10
Con. Virginia	24	Seg. Belcher	37
Confidence	6	Sierra Nevada	6
Crown Point	6	Silver City	..
Eureka	40	Silver Hill	..
Exchequer	4¾	South Comstock	3
Gould & Curry	9	South California	..
Hale & Norcross	9	Southern Star	..
Indian Queen	..	Trenton	..
Julia	2¾	Union Con	7
Justice	12	West Belcher	..
Kentuck	5	Yellow Jacket	12
Kosuth	..	Young America	..
Leopard	1½		

The *Commercial Herald*, under date of the 15th inst., says: "The past week has witnessed one of those stock flurries to which our community used to be subject in the apparently long ago past, with this difference—that when they formerly occurred they were not quite so spasmodic in their manipulation, nor so short in their duration. The present opportunity seems to have been jumped at with a most ravenous avidity, and the excitement about this one stock—Ophir—was carried to the highest pitch. In the brief period of two or three days, the valuation of this stock rose and fell some three millions of dollars, and under this influence almost wholly arresting operations for an entire day along the course of the Comstock. This fully demonstrates the speculative disposition that lurks in our feverish community—this chancing element which must some day give way to more legitimate operations. We are just as much gratified as any one can possibly be when new developments are announced, but we cannot justify the unhealthy fever such developments, and particularly when not yet fully proved, send abroad, bringing those to invest who had better keep aloof—those who may possibly have taken their all out of our reliable savings banks, and in a reckless, unthinking manner, put it in stocks. Turns in stocks must now be made quickly in order to realize the small profits as compared with former years, and this desire manifested itself in the strongest manner during the period under review."

A despatch from San Francisco to-day says: "New ninth drift of Ophir mine in solid ore, assaying $90 per ton."

From the mining summary in the *Gold Hill News* of the 14th inst. we take the following: "And now as the north end of the lode gravitates to its proper status, the "solid south" end is proportionately rising and looming up most brilliantly. Alta stock is raising handsomely on the real merits of the ore development in the mine. Justice and Overman show improvement and sympathy. Succor has every indication of being about to sink and drift directly into an ore body, and the east drift of the Yellow Jacket, at the 2,200 level, has run into a vein of solid quartz which gives fair assays. The most lively and unexpected rise is in Lady Washington, the stock touching $15 to-day. Yet this is on no new and valuable ore development in the mine. Work was resumed in it this morning, after several months' rest. The stock is well concentrated and held, and a rumor is current that the Alta development is on the Lady Washington ledge, and covered by the Lady Washington patent. This last rumor we give merely for what it is worth. Meanwhile the great bonanza of the California and Codsolidated Virginia shows no decrease in its munificent ore and bullion yield and the milling facilities will shortly be increased, allowing of still greater bullion returns. The present outlook for both stocks and mines is healthy and cheering.

Quicksilver Mining Co.—The sales of this stock during the week have aggregated only 1,145 shares, of which 495 shares represented transactions in the common stock and the remainder in the preferred. The quotations have been fairly sustained. An 'injunction was granted on the 16th inst,, by Judge Gilbert, in the Supreme Court at Brooklyn, in the suit of Wm. S. Hoyt and others against the company. This restrains the company, during the pendency of the action, from paying any dividends or interest to holders of preferred stock in excess of such as may be paid upon common stock, and from issuing any additional so-called preferred stock. The whole trouble seems to be in reference to the disposition of a million dollars of undivided profits. A suit has also been begun to place all the company's stock on the same footing.

Assessments.—Zalida Gold and Silver, per share, 2 cents, delinquent December 7th; Hornet (Tuscarora, Cal.), 10 cents per share; Utah Mine, $2 per share; Dayton, 25 cents per share.

The Empire (G. V.) Gold Mining Co. has declared a dividend of 25 cents, amounting to $5,000.

The Standard Gold and Silver Mining Co. paid its third dividend of $1 per share on the 12th inst.

Gas Stocks.

NEW YORK, FRIDAY EVENING, Nov. 23, 1877.

Gas stocks are very dull, not a single transaction being reported during the week. With but few exceptions quotations remain as reported a week ago.

People's Gas Company of Baltimore.—130 shares of the stock of this company sold during the week at 13½ per cent.

Belfast, Maine.—The Common Council of this city have appointed a committee to ascertain the cost of changing the city lamps, with a view to burning kerosene instead of gas.

Womelsdorf, Pa.—A fair will be held in this place this winter for the purpose of procuring funds to purchase street lamps whereby to light the town.

Dorchester, Mass., Gas Company.—We note recent auction sales of four shares of the stock of this company, at $99¾ per share.

Lighting Jersey City.—The Jersey City Police Board, on the 15th inst., awarded the contract for lighting the oil lamps in the city to Stephen Parish at $1.48 per lamp per month, and for lighting the gas lamps, at $2.74 per month, to the Jersey City Gas Light Company.

The Cumberland (Md.) Gas Question.—At a special meeting of the Cumberland Common Council on the 21st inst. the follow resolutions were passed:

Whereas, The Baltimore Gasoline Company has refused to carry out their part of the contract passed by this body for the lighting of the streets of this city, and has refused to bond in accordance with that contract; now, therefore, be it

Resolved, By the mayor and city council, that the offer of the Cumberland Gaslight Company to light the city at $25 per post per year with five-foot burners be accepted, upon all lamps supplied with gas pipes. Further, that all other lamps be lighted with coal oil.

The cost of lighting the streets by gas by the above arrangement is about $2,800 per annum.

The Consumer's Gas Company of Baltimore.—The *American Gaslight Journal* of Nov. 16, says: "This company expects to furnish gas in about two weeks. They have fifty-four miles of pipe down, and are now putting up the spans on Monument and Crosby streets to carry the mains across Janes Falls." It will be remembered that this company has adopted the Lowe Water-Gas Process.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas stocks, No. 30 Broad street, N. Y.

Companies in New York and vicinity.	Capital Stock.	Par.	Dividends. Rate per an.	Dividends. Am. of last.	Dividends. Date of last.	Quotat'ns Bid.	Quotat'ns As'd
	$						
Mutual, N. Y	5,000,000	$100	10%	2½	Oct. '77	92	95
" Gold Bonds	90,000	1,000	7%	3½	Feb. '77	100	103
N. York "	4,000,000	....	10%	5	Nov '77	123	125
Metrop. "	2,500,000	100	10%	5	June '77	131	133½
" " Certf.	1,000,000	....	7%	3½	" "	100	103
" " Bonds	500,000	1,000	7%	3½	" "	102	—
Harlem "	1,850,000	50	8%	3½	Aug. '77	95	100
Manhat. "	4,000,000	50	....‡	5	Nov '77	210	220
Brooklyn, B'klyn.	2,000,000	52	15%	5	July '77	165	175
Nassau, "	1,000,000	25	....‡	4	July '77	76	80
" " Certf.	700,000	1,000	7%	3½	July '77	98	101
People's, "	1,000,000	10	....‡	3½	July '76	30	45
" " Certf.	300,000	1,000	7%	3½	July '77	80	85
" " B'ds	325,000	....	7%	3	Feb. '77	96	100
Metrop. "	1,000,000	10	5%	2½	Nov '77	*65	70
Wmsb'rg "	1,000,000	50	10%	2½	July '77	117	123
" " Certf.	1,000,000	...	7%	3½	July '77	100	102
Citizen's "	1,200,000	20	....‡	4	Jan. '77	80	85
" " Certf.	320,000	1,000	7%	3½	Oct. '77	97	100
J. C., N. J	750,000	20	10%	5	July '77	160	—
Cent. Westch. N.Y	466,000	50	7%	4	July '77	80	90
Subur'n " "	295,000	50	7%	3½	Oct. '77	—	95
Municipal, N.Y.	1,500,000	100	.....	.....	.....	75	85

‡ Paid irregularly.

* Ex-Dividend 2½ per cent

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147th Auction Sale.
100,000 TONS SCRANTON COAL.
On TUESDAY, Nov. 27th, 1877.

NEW YORK, Nov. 22, 1877.

THE DELAWARE, LACKAWANNA AND WESTERN RAILROAD CO. will sell, by Messrs. JOHN H. DRAPER & CO., Auctioneers, at the Company's Salesroom, 26 Exchange Place, corner of William Street, New York, on Tuesday, Nov. 27, at twelve o'Clock, Noon,

100,000 TONS OF COAL,

from the Lackawanna Regions, of the usual sizes, deliverable at Hoboken, during the month of December, 1877.

The sale will be positive; each lot put up will be sold to the highest bidder.

No Bids, in any form whatever, being made for account of, or on behalf of the Company.

The conditions will be fully made known at the time of sale.

TERMS—FIFTY CENTS PER TON, payable in current funds, on the day of Sale, and the balance within ten days thereafter, at the office of the Company.

SAMUEL SLOAN, President.

THE DELAWARE & HUDSON CANAL CO.'S REPORT, reviewed by the Engineering and Mining Journal, price 15 cents. For sale at this office.